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A MUSEUM BUILDING FOR THE GLENBOW FOUNDATION

CALGARY, ALBERTA

Part I 441

Undergraduate Thesis in Architectural Design

By

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at

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F O R E W O R D

The intent of this thesis research report is to develop a building program for a hypothetical architectural problem. Because an actual organization, the Glenbow Foundation, Calgary, Alberta, was chosen as the subject around which this report is written, it is necessary to state that the opinions and conclusions reached by this author do not necessarily reflect the opinions of the administration of the Glenbow Foundation. This is due partly to the uncertainties of expected growth and expansion of the Foundation. Information presented to this writer by personnel of the Foundation was with the understanding that such information is hypothetical and should not be interpreted as binding or committal.

March 16, 1967. Danny T. Dorosz

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I N T R O D U C T I O N

Glenbow Foundation began as a private endeavor of Eric L. Harvie and his family. In 1955, Glenbow Foundation was incorporated and has since then concentrated its effort on the preservation of the history and heritage of Western Canada and its people. In cooperation with Civic, Provincial, and Federal authorities, public museums and galleries have been established which the Foundation hopes will lead to a series of similar institutions contributing to the improvement of educational and cultural facilities in Western Canada. Departments within the Foundation include Archeology, Archives, Art, Ethnology, Fine Arts, Library, Mineralogy, Military, Natural History, Pioneer and Agriculture, and Service Divisions.

In addition to presenting the history of Western Canada, the Foundation has supported Archeological digs abroad and the various departments have extensive collections from around the world.

The Glenbow Foundation is a charitable organization and financed principally by a trust fund set up by Mr. Harvie and the Province of Alberta, by donations, and by Provincial grants.

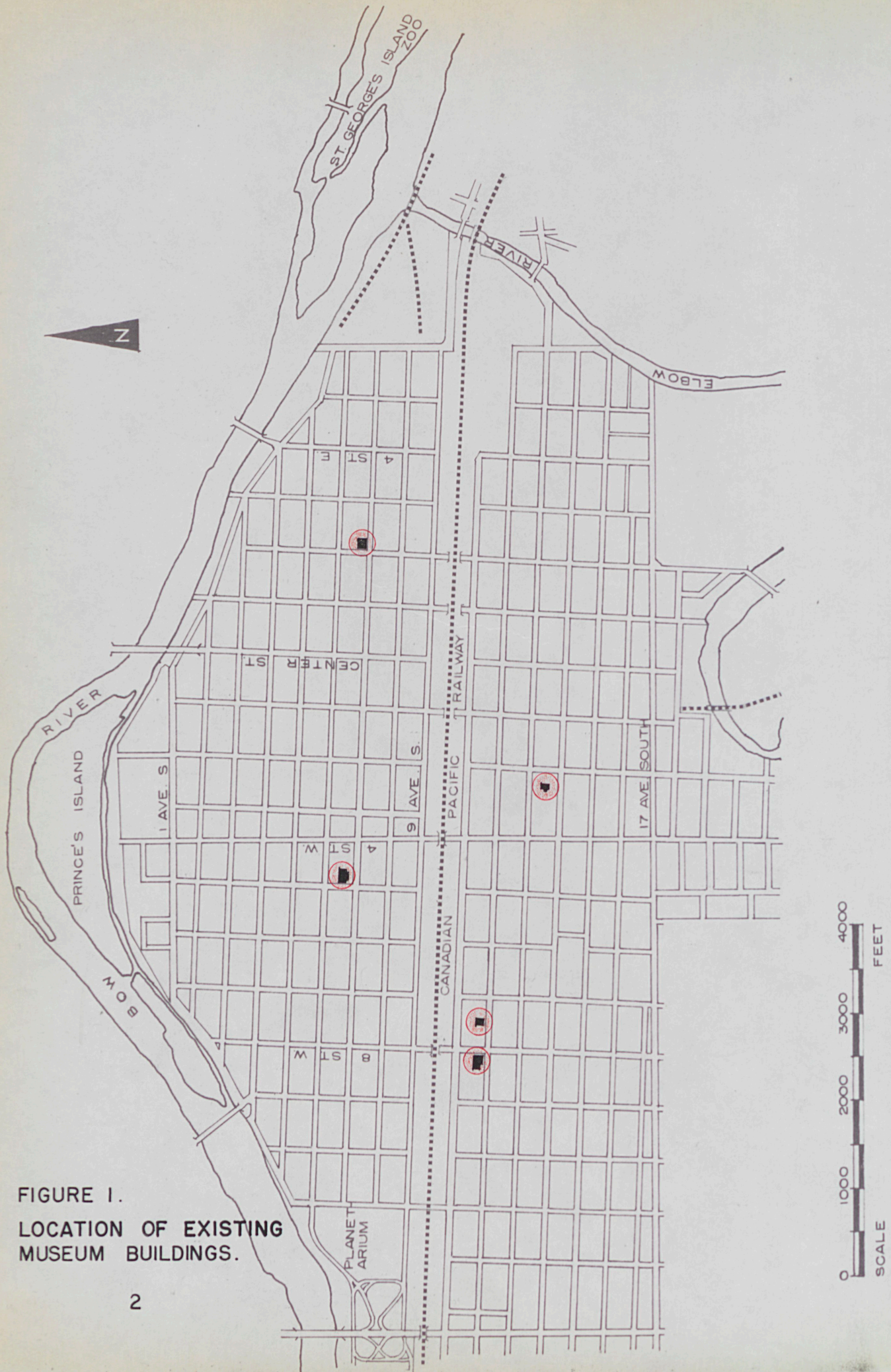


FIGURE 1.

LOCATION OF EXISTING MUSEUM BUILDINGS.

1. CONDITIONS CREATING A NEED

> Go three blocks south, turn right and go straight for another four blocks. The building you want is directly across from a dairy plant.
>
> You're on Eighth Avenue and Fifth Street now. If you keep heading down Eighth Avenue until you reach Eighth Street, then turn left and go for another three blocks, you will be right there. The building is an old Ford Company warehouse. You can't miss it.
>
> The Glenbow Foundation Museum eh! Well let's see. I think its in the old court house on Seventh Avenue. Just keep heading this direction for two or three blocks and look for an old sandstone building on the right-hand side of the street. There's two of them together and I'm not sure which one is the one you want, but you can find that out when you get there.

These might be the answers which one would receive if he asked for directions to some of the five buildings which presently house the Glenbow Foundation's departments in Calgary. The five buildings are made up of two old warehouses, an old court house, an old library building, and part of the third floor of the new Central Library building.

These buildings are located in various parts of downtown Calgary as shown on Figure 1. This situation is undesirable from the standpoint of attracting visitors, both Calgary residents and tourists.

In order to visit several departments of the Foundation, one has to journey to various parts of downtown Calgary to get to the buildings which house these departments. This is especially bad in the case of tourists because they do not know the city and, as in any strange city, they have difficulty finding their way around. Another point is that after visiting the main museum, or any of the Foundation's buildings, many people are not aware of the existence of other departments which have very interesting collections.

Also, because of this spread of facilities, an efficient operation of the Foundation is not possible. Under present conditions, one could draw the analogy of the right hand is not sure what the left hand is doing. This fact was borne out in a personal interview with Mr. Michael Evick, Head Curator, when he said that increased efficiency of operations and improved displays would result if all, or more, of the departments could be located within one building.(9)

Lack of storage, exhibition, and work space is another problem presently facing Glenbow Foundation. Basements and backrooms are being utilized for storage areas and work spaces. These areas and spaces are, in most instances, inadequately lighted, not properly designed for their uses, and poorly located in relation to display areas. When displays are changed, difficulty and inconvenience are encountered because of this poor relationship of work and storage areas to exhibition areas. For example; in the main museum building when an exhibit is to be changed, the display cases must be lowered down an open stairwell by means of a block and tackle because the only elevator is too small to hold the cases. The only other alternative is to dismantle the existing display and move it downstairs piece by piece. The new display cases must

similarly be moved up to the display gallery. This requires the technicans to do much of their work on the exhibition floor where the public is wandering about. This is not desirable and is in direct conflict with Mr. Harold C. Rosé's statement in his thesis on museums in which he stated the following:

> Highly skilled technicians must be provided the proper environment to perform the utmost of their capabilities to insure the maximum result at the termination of the chain of operations.(21:32)

Also, exhibition space is at a premium. Mr Evick stated only approximately one percent of the Foundation's collections can be shown because of this lack of exhibition space.(9) Carl E. Guthe, in his book So You Want A Good Museum, cites a rule of thumb for the ratio of stored items to displayed items. This ratio indicates 40% of the floor space for exhibits, 40% for the storage areas, and 20% for offices and work spaces.(12:18) Although this ratio would not necessarily apply to all museums, it does indicate a substantial area should be provided for the display of collections.

Another point brought out by Mr. Evick, in relation to the main museum building which is an old court house, is the fact that the building itself is considered to have historical value by many people and, therefore, the interior spaces and finishes cannot be altered to any degree. Dark oak wall panelling cannot be removed, narrow doorways cannot be widened because this would destroy the trim, and the court bench cannot be removed because of its historical associations. These restrictions do not lend themselves to the design of desirable exhibit displays or circulation within the building. Renovation seems to be out of the question, but renovation alone would not solve the space shortage problem.

Expansion is pretty well out of the question because of the limited available land surrounding the old court house. Even if expansion is possible, renovation of the present building would be desirable and this is next to impossible as mentioned previously. Other buildings occupied by the Foundation are smaller in area, or otherwise not suitable as a museum, and also cannot be expanded because of limited available land.

In order for the Glenbow Foundation to continue to serve the general public, educational institutions, and cultural organizations in a manner expected of them, they must acquire facilities which meet their demands.

Visitors to the museum recently have reached the 60,000 per year level. 75,000 visitors per year is desirable for a city the size of Calgary (1966 population - 323,289).(10) It is difficult to state conclusively that the low attendance is due to the present situation of scattered facilities, but this could be a very large factor. Another point to take into consideration at this juncture is the anticipated growth of Calgary over the next 20 years. With a projected population of 775,000, (2), the attraction of the public to the museum will certainly increase, which will in turn create a greater demand of the services provided by the Foundation.

During a personal visit to the main museum building, this writer was favorably impressed with the quality of the exhibits presented. The exhibits were arranged to allow easy viewing and, some imaginative planning was in evidence. Colorful background colors in the display cases enhanced objects which might otherwise seem dull and drab. Not all of the objects were exhibited in glass cases which provided relief

from having to view everything through a sheet of glass. However, evidence of the limiting restrictions were also distinct. Uninviting, narrow doorways, windows which caused reflections and obstructions in placing display cases, lighting not properly planned for museum functions, rooms too small for efficient display of collections, crowded storage areas, and technicans working in display galleries are examples of these restrictions.

The staff of the museum should be commended for the quality of the displays which they have achieved despite the restrictions under which they presently must operate.

2. LOCAL CONDITIONS

GEOGRAPHICAL

51°-03' north latitude, 114°-22' west longitude. Using these co-ordinates, one can locate the City of Calgary lying in the fertile foothills of the Rocky Mountains and at the junction of the Bow and the Elbow rivers. From an elevation of about 3450 feet above sea level, the people of Calgary have a magnificent view of the "Rockies", some 50 miles to the west.

The two rivers provide an abundant supply of clean, unpolluted water and inexpensive electrical power not only to Calgary residents, but to most of Southern and Central Alberta. In addition, the Bow River is a source of water for an extensive irrigation project reaching north, east, and south of the city, serving some 160,000 acres of land. The Bow also flows into the South Saskatchewan River which is being developed to provide irrigation for approximately 500,000 acres of land in the province of Saskatchewan.(8:446-7)

CLIMATIC

The extreme temperature range for Calgary is a high of 97 degrees and a low of -49 degrees. The average temperature for July is 62 deg-

rees and for January, 14.2 degrees. Average snowfall, 58.5 inches; average rainfall, 11.6 inches; average total precipitation, 17.4 inches inches.(19:39)

The Chinook winds, which bring warm Pacific air through the mountains to Southern Alberta, provide relief to the long winter months, and, because of these winds, it is not uncommon to have a 40-50-degree rise in temperature over a matter of a few hours.

HISTORIC

A detachment of the North West Mounted Police established a post at the junction of the Bow and Elbow rivers in September, 1875. This was the beginning of Calgary and was so named after the ancestral home of Colonel James MacLeod. Translated from Gaelic, Calgary means "clear running water".

In 1881, Calgary's population stood at 75 people. The Canadian Pacific Railway reached Calgary in 1883 and, in 1884 the settlement was incorporated as a town. 1893 saw Calgary grow to a population of around 4000 and in the same year, the town became a city.(2) After the completion of the railway to the Pacific coast, Calgary's population rose steadily as shown by the following tabulation:

Year	Population
1906	11,967
1916	56,514
1926	65,291
1936	83,407
1946	100,044
1956	179,711
1966	323,289 (19:80-1)

The 1986 population forecast for Calgary is 775,000.(2) Calgary is presently Alberta's second largest city and Canada's eighth largest city. In area, Calgary covers 155.8 square miles.(2)

ECONOMIC

The greatest economic boosts to Calgary, after the completion of the railway, were the discoveries of petroleum and natural gas at Turner Valley, 1913, and of crude oil at Leduc, 1947, which led to Calgary becoming the operations, administrative, and financial center of Canada's oil industry.(4:629) In addition to this, Calgary is in the center of a highly diversified agricultural region and is located in Canada's greatest ranching area which supports the second largest public livestock market in Canada.(6:489) Calgary also ranks as an important wholesale and retail center together with numerous allied industries totalling more than 300 manufacturing plants.(3:193) As a transportation hub, Calgary is served by two transcontinental railways and four branch railways; ten transcontinental trucklines and numerous interprovincial trucklines (the Trans Canada Highway passes through Calgary); three bus lines; and several major airlines use the air terminal facilities.(19:5,9) In banking, Calgary ranks fifth in Canada with check transactions totalling $14,070,305 in 1964.(8:1069)

The tourist industry plays an important role in Calgary's economy with an estimated 2,468,000 people visiting the city in 1965. The Calgary Exhibition and Stampede is a big drawing card for the tourist industry bringing an estimated 216,000 out-of-town visitors during a six-day period in 1966.(2)

Calgary's industries might not be classed as all being very large, but certainly very diversified.

SOCIAL

Although Calgary enjoyed a very colorful and western youth, the

growth of the city, especially since World War II, has overpowered this background and turned Calgary into a cosmopolitan city*. Once each year, however, during the second week of July, Calgarians shrug off this cosmopolitan atmosphere and play "cowboy". The world famous "Calgary Stampede" is the reason. During this week, Calgarians, to the delight of the tourists, liven up the otherwise conservative city with night street dances, breakfast cooked and served from chuckwagons parked on the streets, singing cowboys, and general pandemonium somehow controlled, but not seemingly so.

Ethnic backgrounds of the residents of Calgary are as varied as the economical background of the city. These two factors, undoubtedly, are the reasons why Calgary is a city of people with varied interests and, not one which seems to be predominately of single interest or social class. Calgary, as any other city its size, tends to have something of interest to offer to all types of people, from the transient through to the multi-millionaire.

EDUCATIONAL

Educational facilities in Calgary include:(19:63-72)

1. 135 public schools
2. 42 parochial schools
3. Mount Royal Junior College
4. Southern Alberta Institute of Technology and Art
5. University of Alberta, Calgary Branch
6. Various private and business schools

---

*Two very interesting books about the history of Calgary and its people are referred to :

1. Calgary Cavalcade, by Grant MacEwan. Published by the Institute of Applied Art, Ltd., Edmonton, Alberta, 1965.
2. Tales of the Old Town, by Leishman McNeill. Published by The Calgary Herald, Calgary, Alberta, 1966.

CULTURAL

Organizations, societies, and other related facilities available to the people of Calgary are:

Calgary Allied Arts Center
Calgary Aquarium
Calgary Horticultural Society
Calgary Zoological Society
Calgary Film Society
Calgary Public Library system
Calgary Symphony Orchestra
Glenbow Foundation
Heritage Park
Historical Society of Alberta
Horseman's Hall of Fame
St. George's Island Zoo and Natural History Park
The Queen's Own Rifles of Canada Regimental Museum
and many others

Recreational and entertainment facilities:

Calgary Exhibition and Stampede
2 daily and 3 weekly newspapers
6 radio stations
2 television stations
Horse racing
Hunting, fishing, boating, and camping
Nightclubs
Miscellaneous individual sports
Miscellaneous public parks
Professional and amateur sports
Skiing (Banff area)
Southern Alberta Jubilee Auditorium
Numerous theaters
and others

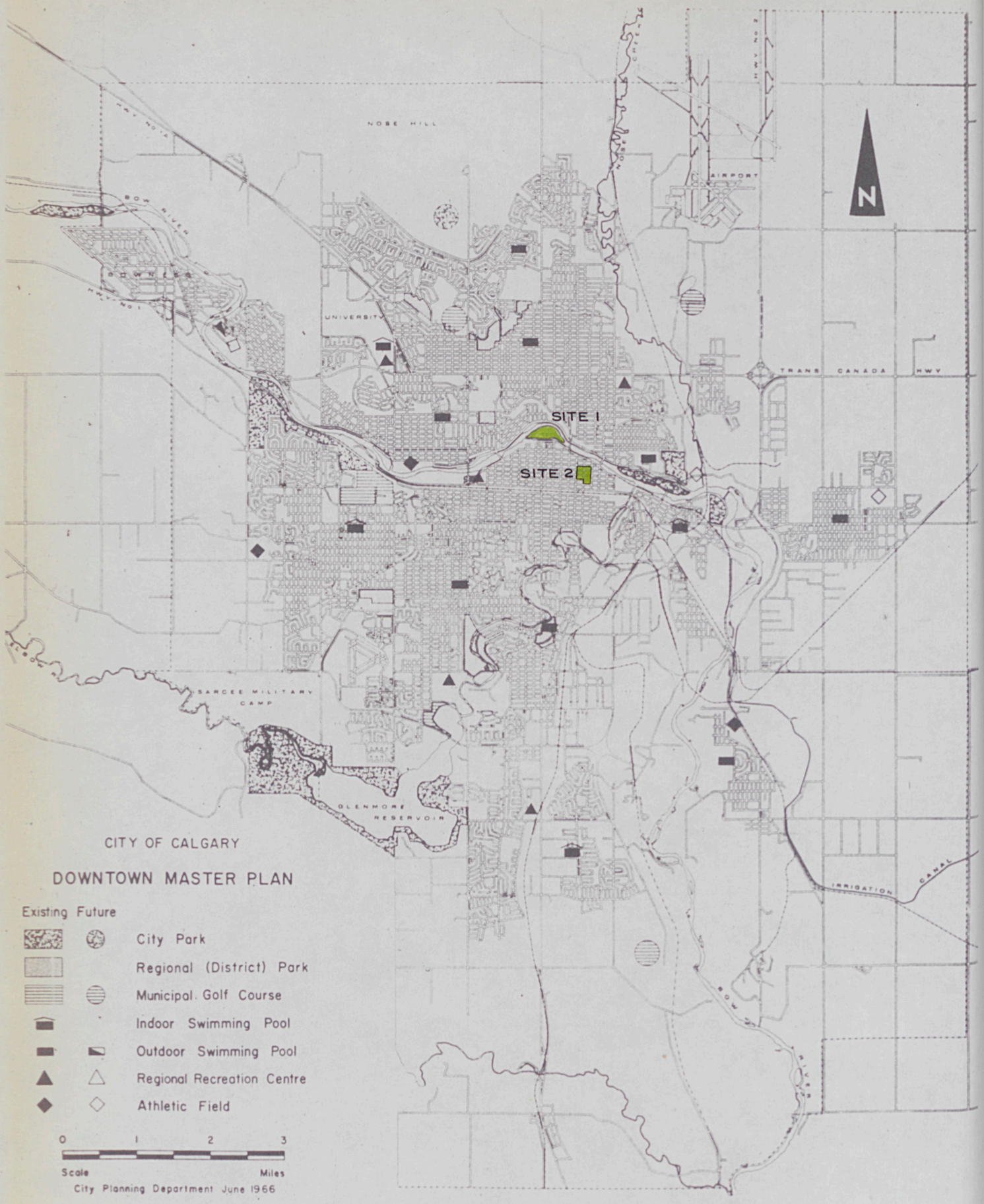


FIGURE 2. LOCATION OF PROPOSED SITES WITH RELATION TO CITY. (11:67)

3. SITE CONSIDERATIONS

Two sites are being considered for this proposal -- Prince's Island and an area in an urban renewal scheme, both located in downtown Calgary. (See Figure 2)

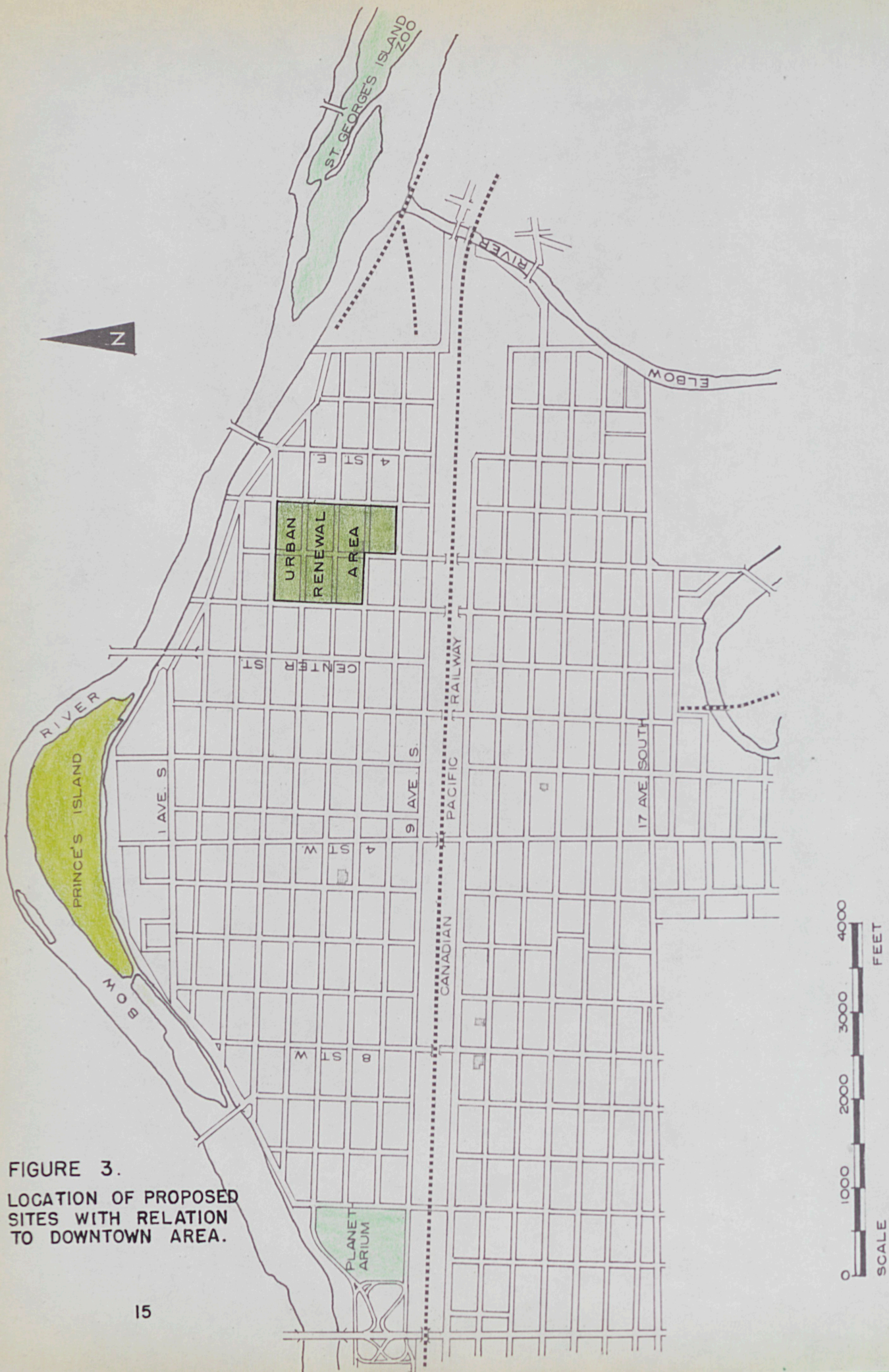


FIGURE 3.

LOCATION OF PROPOSED SITES WITH RELATION TO DOWNTOWN AREA.

SITE 1 - PRINCE'S ISLAND

This site, approximately 38 acres in area, lies in the Bow River, north of the Central Business District of Calgary. (See Figure 3)

In 1913, Thomas Mawson, a city planner, proposed in his plan for the City of Calgary that Prince's Island be the focal point of the development of the downtown area. Unfortunately, World War I intervened and this plan was never realized. Today, Prince's Island stands as a picnic ground and recreation area flanked by buildings with incipient signs of decay.

Adjacent Environment

To the north, across the river, is an old residential area spotted with new apartment buildings. South of the island is a mixed land use including light industrial, obsolescent housing, service shops, parking lots, and a baseball field. This area is scheduled for an urban renewal program and will eventually be zoned high density residential and riverbank park. (See Figure 4, page 24)

The site is also located centrally between two points of interest -- St.George's Island Zoo and the Centennial Planetarium due to open sometime this year. (See Figure 3) The importance of this location will be discussed under the Pedestrian Traffic Patterns subsection.

Topography, Vegetation, and Natural Features

The topography of the island is flat except for dikes, approximately four feet high, built up around the perimeter. The island proper is approximately six to seven feet above the normal water level. This writer proposes that the existing dikes be raised another two or three feet to ensure against the possiblity of the island being

flooded. With this increase in height, the top of the dike will be approximately 12 to 13 feet above normal water level. This increase will make the dike around the island about three or four feet higher than dikes on both sides of the river in the vicinity of the island.(25)

Vegetation consists of a random mixture of evergreen, poplar, and small willow trees. Almost all of the island is grassed, including the dike, with several species of ground shrubs planted around the island.

The river which surrounds the island provides an aesthetic advantage not found in many sites. Landscaped walkways could be built on top of the dikes to provide a pleasant walk around the island. Rest areas could be provided and faced toward the river for moments of relaxation.

Views (See photographs on pages 18-23)

Looking north across the river, one can see the tree-lined bank with glimpses of houses behind the trees and headland bluffs in the distance as a backdrop. To the west is the upstream portion of the river with the north and south banks plainly visible and a bridge spanning the river in the distance. The south bank presently is not very picturesque, but it is proposed, by the City of Calgary Master Plan, as a park strip which will enhance the view considerably. Looking south, the skyline of the downtown core can be seen with an unpleasant view of old decrepit houses, shabby service shops, and gravelled parking lots in the foreground. This area is scheduled to be razed in the near future and will be replaced by a high density residential area along with the riverbank park strip previously mentioned. The view to the east is similar to the west view, but lacks the trees

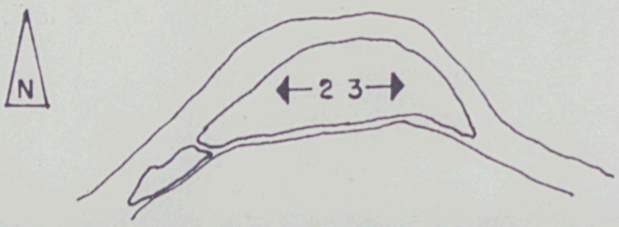


1. VIEW OF ISLAND FROM BLUFFS.





2. INTERIOR OF ISLAND.

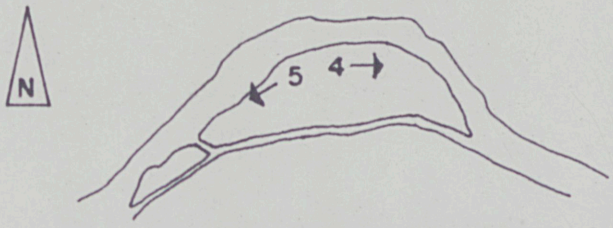




3. INTERIOR OF ISLAND.



4. INTERIOR OF ISLAND.

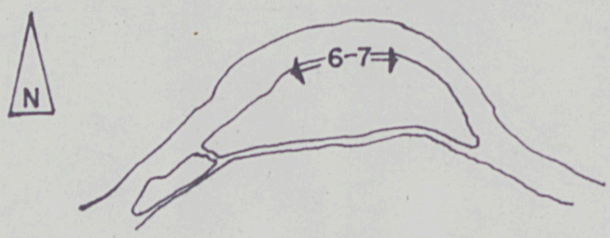




5. LOOKING WEST.



6. NORTH BANK LOOKING WEST.

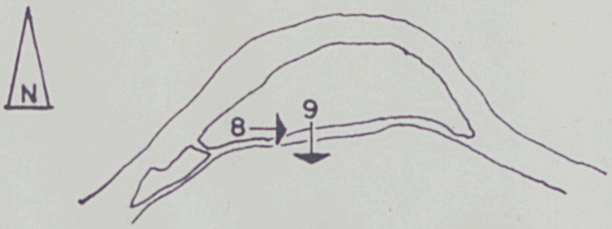




7. NORTH BANK LOOKING EAST.



8. SOUTH BANK LOOKING EAST.

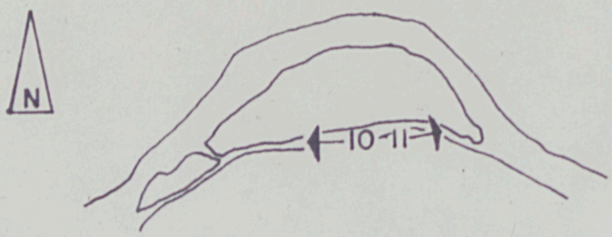




9. VIEW OF DOWNTOWN SKYLINE



10. LOOKING WEST ALONG SOUTH CHANNEL.





11. LOOKING EAST ALONG SOUTH CHANNEL.

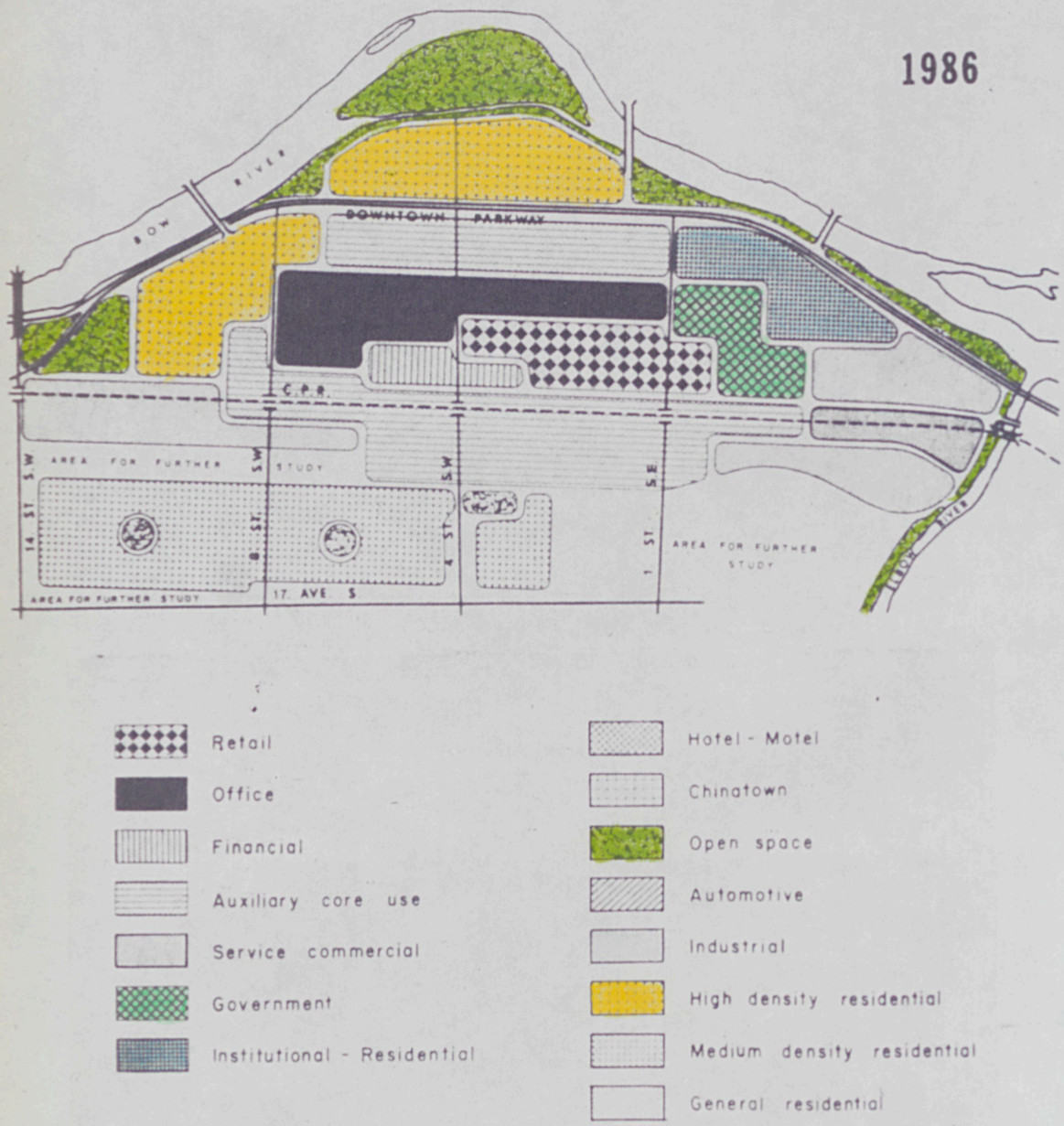


FIGURE 4. CITY OF CALGARY DOWNTOWN MASTER PLAN – 1986 PROPOSED ZONING. (II:35)

on the north bank of the river. The proposed south riverbank park will extend in both directions as far as the eye can see from the island.

Zoning

The Downtown Master Plan for the City of Calgary indicates a zoning of "Recreational Area" for the island. (See Figure 4) In a discussion with Mr. H. Porter, Principal Long Range Planner, City of Calgary Planning Department, this writer found that the museum could be located in this area, without creating too much opposition, because of the cultural and recreational aspects of a museum. The consensus was that with proper and intelligent planning, a park-like atmosphere could be maintained and perhaps even enhance the area.(20)

Restrictions set by the City of Calgary Building Bylaws and the National Building Code will have to be adhered to.

Vehicular Traffic Patterns

Present:

The island is accessible only from the south side of the river. This, however, is not of great concern because the traffic travelling to the downtown area from the north is required to cross the river in any case. Once across the river, getting to the site is relatively easy. The main downtown traffic stream is well removed from the site and the additional traffic generated by the museum shouldn't add any additional aggravation to the existing congestion problem in the downtown area. The present downtown traffic patterns do not appear to offer very much difficulty in reaching the island.

A limited amount of parking is available on the island itself which means additional parking will have to be provided.

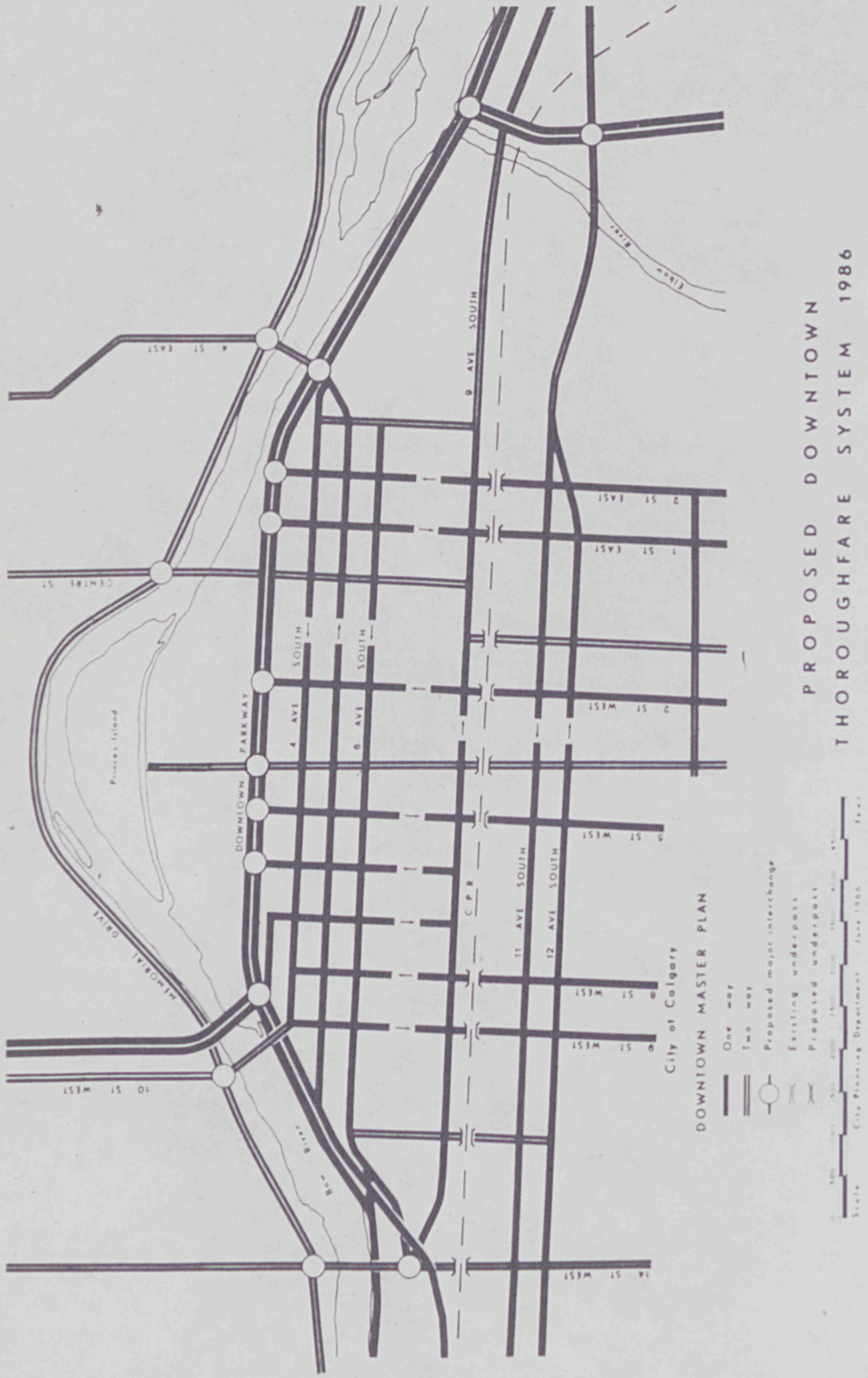


FIGURE 5.
PROPOSED DOWNTOWN THOROUGHFARE SYSTEM. (11:43)

Future:

Figure 5 shows the proposed downtown throroughfare system. This plan indicates that 4th Street West will be the primary access to the site with a major interchange at the intersection of this street and the Downtown Parkway. This parkway should provide easy accessibility to the site from any part of the city and also make it fairly easy for tourists to locate the museum. (See Figure 6, page 28)

Pedestrian Traffic Patterns

Present:

Pedestrian access to the island is from the south side only. Pedestrians using the transit system have to walk from four to seven blocks from the downtown core in order to get to the island. No existing developed walkways lead to the island and pedestrians must walk past run-down buildings and unattractive surroundings to reach the site.

Future:

Two pedestrian walkways are planned from the downtown core area to the island, (See Figure 6, page 28), with some discussion of a pedestrian bridge linking the island with the north river bank.(11:66) The proposed riverbank development will provide leisurely landscaped walkways from the Zoo to the east and the Planetarium to the west.

The proposed high density residential area adjacent to the site will be within easy walking distance of the island.

Presently, a jet-boat transportation service operates during the summer months to and from the Zoo and Bowness Park, some 9 to 10 miles to the west, and travels past the island. It is possible that this

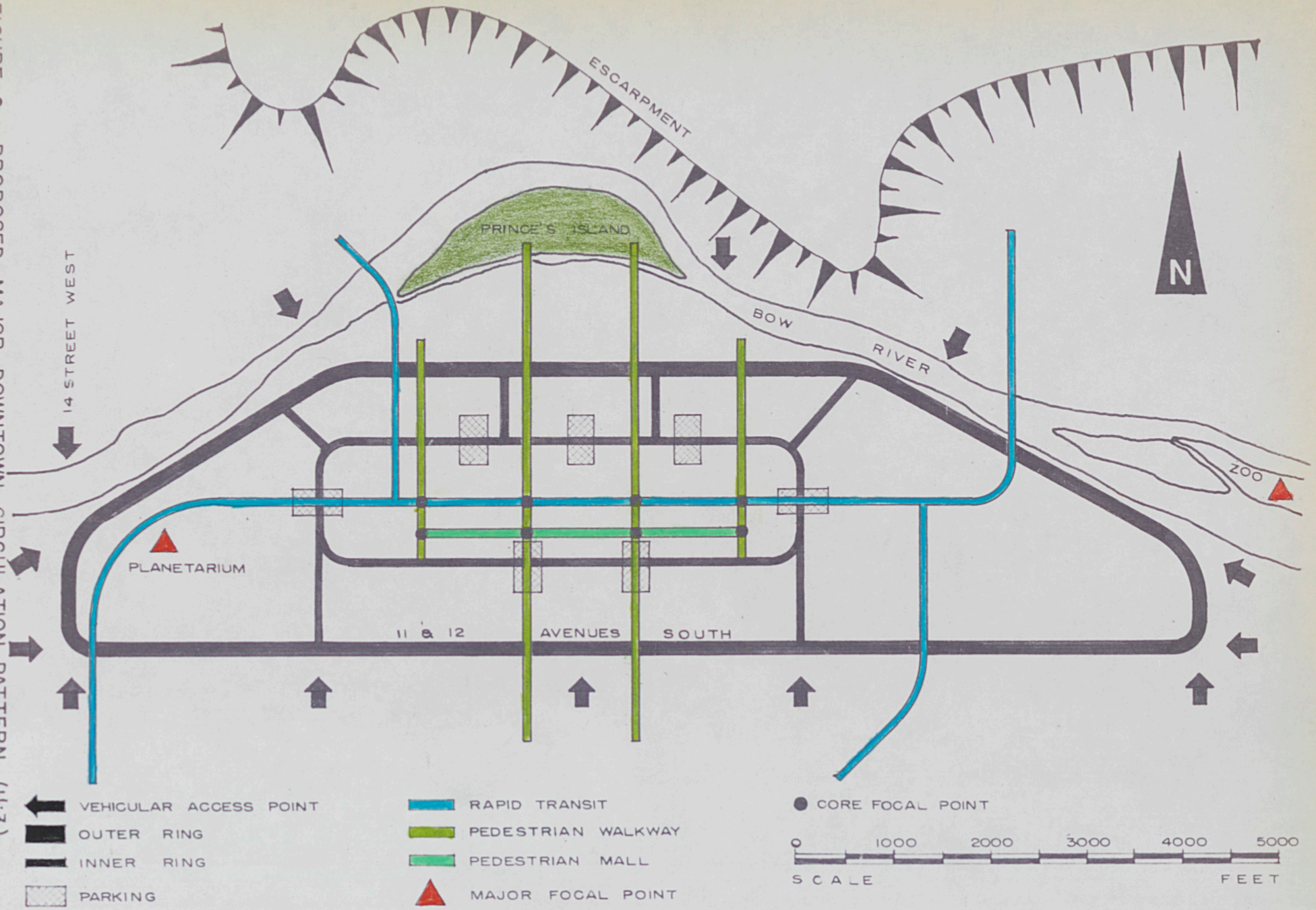


FIGURE 6. PROPOSED MAJOR DOWNTOWN CIRCULATION PATTERN. (II:3)

service could have landing points at the island and Planetarium site which would provide an easy means of transportation between several points of interest. It would then be possible for a visitor to ride the boat to the museum from the Zoo, or any other point, and then walk back along the riverbank walkway to his starting point if he so desires. Alternatively, a separate service could be started to shuttle people between the three points of interest.

Proposed transit system routes will not be changed drastically from existing routes, however, the proposed pedestrian walkways will make the walk from transit system stops much more pleasant.

Soil Analysis

Test-hole information from a hole drilled adjacent to the island indicates the following:(26)

0 - 2.8 ft. -- coarse to medium coarse gravel
2.8 - 8 ft. -- sandstone, medium grained
10 ft. -- ground-water line
8 - 14 ft. -- clay, dark gray, shale

Utilities

All required utilities are available within distances of one block and no difficulties in bringing these services to the island are foreseen.

SITE 2 - URBAN RENEWAL AREA

This site is located on the eastern edge of the downtown core of the City of Calgary and is presently being cleared under an urban renewal project. (See Figure 3, page 15)

Adjacent Environment

The fact that this area is being cleared indicates it is located in a blighted area. The plan of the City of Calgary is to rejuvenate this area into an attractive "multipurpose complex directed towards the government and cultural services of Calgary and its regions".(11:63)

Present buildings within this area which will remain are the City Hall and new Administration Building, new Central Public Library building, and new Police Department building.

Topography, Vegetation, and Natural Features

The area is relatively flat, but does slope down slightly to the north towards the river.

Any existing vegetation will probably be removed as the clearing project proceeds, but this will be of little consequence because of the limited number of trees in the area.

There are not any natural features which could be considered outstanding or of importance in this area.

Views

The views from the site will be primarily of the surrounding buildings. It is possible that the bluffs on the north side of the river can be seen, but this will depend upon the height of the surrounding buildings.

Zoning

Under the City of Calgary's Master Plan, part of this area is designated to cultural uses in addition to governmental uses.(11:63)

Restrictions set by the City of Calgary Building Bylaws and the National Building Code will have to be adhered to.

Vehicular Traffic Patterns

Present:

Access to this site will have the same difficulties encountered when travelling to the downtown core. The major difficulty, at present, is the downtown congestion, but this could be overcome, to a degree, by using streets that do not traverse the actual downtown core.

Parking at the present time is not very plentiful in this area.

Future:

The proposed traffic patterns can best be seen by studying Figure 5, page 26. Access to the site should be fairly easy from any part of the city by using the Downtown Parkway or other major streets leading to the downtown core. (Also see Figure 6, page 28)

Pedestrian Traffic Patterns.

Present:

Pedestrians, from any part of the city, using the transit system can be brought within one or two blocks of the site, which is an easy walking distance.

The site is close to the downtown business area which will enable interested parties to spend part of their lunch breaks at the museum.

Existing residential areas, north of the river, start at a distance of approximately four to five blocks away.

Future:

Proposed residential areas will be located 2 to 10 blocks away from the site. The proposed junior college will be within walking distance for students and faculty. (See Figure 4, page 24)

St. George's Island Zoo is about 10 to 12 blocks to the east and would also be within walking distance. The growth of the downtown business area will also provide additional potential visitors to the museum.

Proposed transit routes will not be changed to any extent from present routes and will still provide easy access by transit bus.

Soil Analysis

The only information available regarding subsurface conditions for this site is the ground-water level which was found at approximately 12 feet below grade.(26)

Utilities

Because of the renewal project, some utilities may be disturbed, but all will be available or made available at the site.

4. FUNCTION OF A MUSEUM

> A museum's basic function is to be a source of information. The very name, museum, means the house of muses, alias the inspirers of the human race. If a place is not inspiring it is not truly a museum. It may be an antiquarium, a group of collections, a storehouse, a morgue in which lie, embalmed as it were, the relics of the half forgotten or ignored past, but it is no home of the muses. (24:8)

In what way can a museum fulfill its function of "a source of inspiration"? The museum must become a medium of communication. The museum has to:

> ... sharpen the encounter between the object and observer, to make possible a communication between artifact and individual.
>
> Since the museum is a medium of communication these are important intentions. It is primarily, but not necessarily exclusively, concerned with the visual communication of objects of cultural and scientific interest, both cultural and scientific used in their widest sense. Unless, therefore, the museum is able to fulfill this task it is failing in its purpose. Museum design, both in terms of architecture and display, must thus at least make possible such communication and, preferably, actively contribute to it. (1:7)

Perhaps the greatest factors, in America, which have led to the museum becoming a source of inspiration are the mechanization of labor

and specialization. These have brought dullness and monotony to the people. The office worker is tied to his office machines, the factory worker repeatedly performs his mechanical operations, the driver monotonously manipulates his wheels and levers. Specialization has created one doctor a pediatrician, another doctor a obstetrician, one lawyer a barrister, another lawyer a solicitor. (24:8)

People subjected to the dull routine of everyday living need to have an outlet; they need to have something which will refresh their minds and bodies, even if for only a moment. The museum can provide this "charge" for some by taking them back into the past and away from the repetition of modern day. Others are inspired by the works of art of the great masters or, of the not so great masters. Some come to study and learn, others just come, simply because they are curious or bored.

The museum, therefore, is not exclusively for the scholarly, but also for those who wish to look and perceive, then walk away, perhaps a little more enlightened.

Because of the diversity of the types of visitors to a museum, a diversity of types of galleries and presentations must also exsist. If this diversity is not maintained, a phenomenon called "museum fatigue" is likely to occur. Museum fatigue is said to be not only due to the physical efforts of standing and walking, but also to the visual monotony of static illumination. (1:11)

Therefore, each gallery must not only provide interesting exhibits, proper lighting, but also a means of physical relaxation by use of rest areas or, by the injection of something new to look at for a brief period of time. This "break" must occur at some point,

and be of such a nature, so as not to cause the veiwer to completely lose interest in what he was originally looking at.

FUNCTIONAL OUTLINE

The points dealt with so far, although called functions, could perhaps be better labelled "objectives". Functions can be the methods of achieving the objectives and could be broken down as follows:

1. Curatorial Functions
    a. collection, preservation, identification, documentation, study, and restoration.
    b. storage of collections.
2. Display Function
    Thematic and changing displays of selected objects and documents, from the collections, arranged to tell a story.
3. Display Preparation Function
    The preparation of exhibits.
4. Educational and Public Functions
    a. lectures, school tours, society meetings, films, and social functions.
    b. reception, information, sales, and supervision of display galleries.
    c. public requirements.
5. Other Services
    a. mechanical.
    b. janitorial. (14:8)

PRINCIPLES OF MUSEUM PLANNING

The following principles describe methods of approach that should be followed to achieve success in the design and operation of a museum. (14:20-21)

Museum Building

1. Functional Organization

The first step needed to begin planning for an efficient and practical building requires the drawings of diagrams showing functional relationships and space organization. "The architectural maxim that 'form must follow function', is the basic requirement of a successful museum plan." (14:20)

2. Efficiency

Efficiency is the result of successfully achieving the desired relationship of; the spaces provided, the tasks to be performed, and the size of the staff.

Distances that exhibits have to be moved should be kept to a minimum. If basements are to be used for storage, the inclusion of an ample sized elevator is mandatory. It is more desirable to locate storage rooms on ground level, if possible, with direct access from the workrooms and be adjacent to the display area. This will allow for easy exhibit changes and cross-referencing of curatorial records located in the office-work area and collection storage area.

3. Separation of Functions

A separation of each basic function from other functions is very

desirable to insure that any one function does not appear to be of less importance. Public areas have to be separated from staff areas. Access from the public areas to the staff areas should be by means of only one door in order to provide effective control. Stored collections, workrooms, and offices should only be accessible from the staff area. Access from the staff areas to specific display areas should be direct and by means of locked doors.

Display galleries, lecture rooms, and meeting rooms should be individually and directly accessible from the lobby. This will allow any one of these areas to be closed independently of the others. The necessity for this arrangement arises when the lecture rooms wish to be used at times when the galleries are closed, such as in the evenings.

4. Display Relationships

When a visitor enters a display room, he should be presented with the beginning of the story and from there, follow a natural sequence around the exhibits without confusion. In most cases, an elongated room is the most effective shape to promote this type of movement.

Rectangular rooms provide maximum perimeter space for display cases or panels. The center of this space can be used for seating or for feature displays.

Outdoor displays should not be overlooked for they can provide a stimulating change of exhibit space and material. This is especially true if a courtyard can be used in the summer for outdoor displays. The courtyard should be enclosed, with or without a roof depending

upon the type of objects to be displayed, and should be directly accessible from the staff areas as well as public areas.

5. Future Expansion

Museums by their very nature are expanding organizations. The building must, therefore, be planned to allow for expansion without disrupting the relationships previously mentioned and, still allow for an aesthetically pleasing structure. It must also be remembered that one cannot design a building to be expanded indefinitely to accommodate growth. A point is reached where a new building must be provided to suit changing requirements.

Collection Storage

> The heart of the museum is its collections. An organization may be an art or history center, a community cultural activity, or a children's recreational service, but it can not be a museum without permanent collections and the manner in which they are cared for and used by the museum, determines its standing among other museums, and its prestige in its community. The organization, the management and the activities of the museum exist solely to insure the continuous adequate care of the materials in the collections and their effective use for cultural and educational purposes. The first obligation of a museum is to recognize and assume the responsibilities inherent in the possession of its collections, which are held in trust for the benefit of the present and future citizens of the community. (12:1)

Collections or objects which are to be placed into reserve must also receive proper care and not just put away in a corner. Objects in the collections must be arranged and classified into groups; easily available for reference, study, display and restoration; and they must be kept clean and safe from damage. These objects must be numbered and grouped so they can be individually located from the

museum accession records and catalogue cards. Just as a library must have properly organized file cards and stacked books, so must the museum have well managed and organized collections.

> Generally speaking, most of the materials in the collections should be housed in a compact and orderly fashion in filing rooms, analogous to library stacks, which are not open to the general public. A good rule of thumb is to assign as much floor space to these rooms as is used for exhibits. (12:8)

A museum which does not take steps for preservation and care of its collections soon finds that worthwhile items become difficult to acquire from donors.

Preservation of collections, requires provision of proper and suitable storage equipment. Guns should be stored in racks; textiles in trays or on rollers; clothing on hangers in closets; glass, china, and utensils on shelves or in cupboards; tools in trays or in racks; furniture on shelves or on open floor areas, covered with sheets of muslin or plastic; rocks, fossils, medals, and coins in small cardboard trays arranged in larger trays and placed in cupboards; mounted birds and animals in cupboards; pictures and other framed items hung on mesh screens; maps, prints, newspapers, and large documents in vertical or flat files; photographs and small documents in filing cabinets.

Some items require that they be kept free from accumulation of dust and provision must be made for this. Self-contained enclosed cabinets allow the use of insect-repellant crystals and preservatives to be placed inside the cabinets for objects requiring such measures.

Mobility and flexibility of storage equipment are also very important to allow for varying the location and size of equipment

if the need arises. Standard manufactured steel or wood storage equipment, with moveable shelves, slotted angle supports, and adjustable drawers such as used in industrial storage and libraries, allow for this flexibility.

The more efficient the collection storage rooms, the greater the potential for the study of collections and the changing of exhibits.

LIBRARY AND ARCHIVES

The role of a library and archives department is an important contribution to any museum complex. This is true not only for the research conducted by the museum staff, but also for the information and research conducted by private and educational institutions and by people from the general public..

The principal functions of a library and archives are similar to other departments within a museum, but relate to the collecting, display, and provision of information through research of such materials as private and public papers, records, photographs, prints, letters, diaries, miscellaneous personal documents, newspapers, books, pamphlets, and many other similiar items.

In a personal interview Mr. R. O. Harrison, Director of the Provincial Museum and Archives of Alberta, said the library and archives should be located so their facilities could be used without actually entering the main portion of the museum building. Further, he stated that staff members, of the museum, should have direct access from their work areas to the library-archives without passing through public areas. (13)

These recommendations of separation of public accessibility, but direct accessibility by staff, seems to indicate separate entrances for the museum and library-archive function. This could be achieved fairly readily by the library-archives becoming a "wing" of the total complex.

PUBLIC AREAS OTHER THAN DISPLAY

A lecture hall or auditorium will provide the facilities for presentation of lectures to large groups, making use of projection equipment. A desireable feature in the design of an auditorium of this type would be accessibility directly from the lobby without the need of passing through exhibit areas. Access to the stage, or platform, should be direct and not through the audience seating area. The design of the room should include all of the criteria set up for any auditorium.

Seminar rooms are smaller rooms than the auditorium and would be used mainly by school or adult groups on special tour of the museum. Some type of projection equipment should be included. Locating seminar rooms close-by the auditorium is desirable. Exhibits could also be displayed in these rooms.

The sales area is usually located in proximity to the main entrance. Items on sale include documents written by staff members, prints, slides, replicas, and souvenirs. This area could also be used as an information desk.

A coffee shop or small restaurant is a relatively new addition to museum planning, but it seems to play an important role and is becoming quite popular. This facility can provide the required "break"

to prevent museum fatigue. "Located strategically, it can be used to stimulate the use of the museum, but should not interfere with its operation." (21:50)

General service areas for the convenience and comfort of the public include restrooms, coatrooms, public telephones, and informal lounge areas.

AREAS EXCLUDED FROM THE PUBLIC

Receiving Area. Activities within this area include the unloading, recording, cataloguing, and storage of each item brought into the museum. As the item is received, it is immediately checked for damage and the presence of vermin. The item usually is also photographed before being put into storage.

Shipping Area. The activities here require the same procedure as receiving, but in reverse order. Photographing items being shipped out from the museum is a good practice for record keeping.

The location of the receiving-shipping area should be in an inconspicuous portion of the building. The loading platform should be located on the ground level for easy handling of bulky items. Some means of protection against wet weather should be provided for the loading platform.

Fumigation Area. This room is used to fumigate objects infested with vermin. It should be large enough to handle bulky items, but not so large that it becomes difficult to control its use efficiently. This facility should be located near the receiving room, and needs to be vented to the outside.

Storage Areas. These areas have been discussed previously, but they need some additional comment. It is imperative that individual depart-

ments have their own storage areas adjacent to their display and workshop spaces. In addition to providing storage space for the collections, storage for miscellaneous items such as shipping crates and building materials is needed. Space for items which have been processed and are awaiting display space has to be provided for in an area safe from possible damage or theft. Ample provision of storage space is often neglected in museum design which causes inefficient operation.

The following five areas are used by highly skilled technicians who require equipment and spaces condusive to the work required of them. All the exibitions are designed and fabricated in these areas.

Shops should be located so their facilities are readily available to the technicians using them. Equipment most commonly found in these shops include power and hand tools, benches, screened paint booths, and an assembly area.

Photographic Studio. Complete photographic and microfilming facilities should be provided.

Artists Studios. These studios will be used by painters, preparators, and dioramists. Ample work space, good lighting and ventilation, storage space, and freedom from disturbances are requirements.

Preparation Studio. Taxidermists and dioramists work in this space. Equipment and facilities required include a stove, sink, deepfreeze, gas, compressed air, water, cabinets, storage bins and shelving, work-tables, hand tools, some small power tools, and a paint-booth with a fan and hood.

Assembly Area. This area becomes the space of final assembly of all sub-assemblies before being installed in the gallery.

Library. This is a small library containing research information

of interest to the museum personnel.

Administration. The activities concerned with here are different than those of the museum proper. These include routine business transactions, reports of museum functions, payroll requirements, general information and requests, and other operations normally found in an administration office. Office spaces will be needed for the administrative personnel and clerical help.

Service Facilities for Personnel. These include restrooms, locker-rooms, and a lunch-room.

General Services. Under this category fall services that all departments can avail themselves of. This would include janitorial services and others. (21)(1)

DESIGN CONSIDERATIONS

Gallery Design

Harold Rose', Dean of Professional Schools, Montana State University, in his thesis on museums, grouped galleries into three types:

1. Room-to-room.

This arrangement consists of spaces, or rooms, laid off in a continuous row of chambers, each one accessible from the other. The advantage here is the arrangement is simple, economical, and easily adapted to small buildings since corridors are not needed. Disadvantages include the necessity of circulation through all exhibits and the problems encountered during exhibit changes. This type of arrangement tends to increase the possibility of museum

fatigue to occur.

2. Corridor-to-room.

In this arrangement, each gallery space is accessible from a common passageway. Advantages include the ability to go directly into an exhibit area without going through other exhibit areas and, a gallery may be closed off during an exhibit change or renovation without disrupting the remainder of the museum. Disadvantages are the large area required for circulation, limited flexibility of circulation, and restriction of movement through confined entrances. Museum fatigue is not as likely to occur as in the room-to-room arrangement.

3. Nave-to-room.

This arrangement is a group of rooms clustered around a central chamber. The advantage of this type of arrangement is that it provides a common orientation area allowing perimeter space to be used for display purposes. Here again, the possibility of museum fatigue is lessened. (21:18-19)

Another interesting breakdown of display spaces is made by Michael Brawne in his book, The New Museum, where he compares parts of the framework of a city, (paths, edges, districts, nodes, and landmarks) with the equivalent orientation within a museum.

Paths are the routes of movement and the spaces left between the exhibits. These paths can be controlled to determine the sequence which things will be seen. The Guggenheim Museum is a good example of this.

Edges are linear elements which are not paths, but boundaries between parts. In a city, these can be shore lines or railway embank-

ments. Each edge defines, separates, yet helps to make the whole coherent.

Districts are sections which one recognizes as having entered. This can be likened to entering a room, or space, having only one function or purpose. This separation provides a pause between sections of a museum and also makes each unit more recognizable.

Nodes are focal points which one moves to and from because the paths converge there or, because some other activity is concentrated there. Nodes need not be central, or restricted to only one. Each district could have its own node.

Landmarks are points of reference which remain external and are never entered. Courtyards which provide a view, signs which give a clue of position, and objects in another room, which have been revealed by slots or windows, become distant goals and landmarks. (1:14)

Display Case Design

The provision of suitable display cases is one of the most important requirements for creating an effective museum. Cases can be designed by the architect or, in many instances are purchased from firms specializing in the manufacture of museum display cases.

Cases should be made so they may easily moved. This can be accomplished by two methods: 1. the base is raised 6 inches above the floor to allow a trolley to be inserted beneath for moving; 2. use of ball-type casters, which are capable of motion in any direction and can be locked to prevent movement.

Vertical display cases are the most useful against walls, or back-to- back to each other. Sides and back of the cases should be

solid panels so objects or shelves might be hung from them. The side panels should be made removeable to enable a display to be continuous across two or more cases. A removeable lining panel could be incorporated to allow for different texture or color treatments inside any individual case.

The glass front of vertical cases should be constructed so it can be opened easily to allow displays to be installed from the front. All construction should be tight and the removeable panels and fronts should have gaskets installed. This will prevent entry of dust and escape of insect repellents and preservatives within the cases.

Horizontal cases should be used in the center of rooms to allow viewing from all sides.

Because exhibit cases are a capital investment, other methods of displaying objects, which cannot be injured or moved because of their size and weight or because they are securely anchored, can be employed. Free standing objects can be displayed with barriers such as a low-hanging rope separating object from viewer. Other methods of separating the viewer and object, but still maintaining a very close relationship, are the use of gravel beds, water barriers, and plants.

Display Case Lighting

Lighting is a very important aspect of displays and must be treated as such to achieve desirable results.

In many instances, different types of displays require special types of lighting. As far as the typical display case is concerned, fluorescent lights installed in the top of the case with a diffusing

panel under the lights to distribute the light evenly and hide the tubes from view is sufficient. The diffusing panel should be of a type which will absorb ultra-violet rays, emitted by the tubes, to reduce deterioration caused by these rays on artifacts and documents. Alternatively, special sleeves are available which can be slipped over the tubes to reduce the amount of rays reaching the objects in the cases. A hinged lid in the top of the case should be provided for replacement of tubes and cleaning. A duplex outlet in the light box is also desirable to enable spotlighting a display or provide power to an exhibit requiring electrical motivation. Each case should have its own switch, mounted on the top, in addition to the master switches which control different sections of the building. Wiring should be concealed and encased in conduit with several extra feet of length to allow plugging into wall or floor outlets. Small filtered louvers should be provided on top of the light box to allow hot air to escape. The filters are needed to prevent dust from collecting on the top of the diffusing panel.

Uniformity of size, design, style, absence of decoration, good finish, easy maintenance, craftsmanship, unobtrusive color, and careful selection of materials are most vital to the visual aspect of display case design. (14:21-22)

Structural

The plan devised must be capable of practical construction. The roof must be able to span long distances and must be fireproof. Walls should also be fireproof and preferably of masonry or concrete. Bearing walls should be kept to a minimum to allow for flexibility

of space.

Windows

Windows should be omitted from display areas to allow full use of wall surfaces for display purposes. Windows can also, to some extent, inhibit the flexibility of display planning. Reflections, from windows, on glass make it difficult to see the contents of the case and read labels. Sunlight causes fading and damage to fabrics, documents, and paintings. Security problems, additional heating costs, extra maintenance, and dust infiltration are other negative characteristics of windows in display galleries.

Mechanical

Heating by warm air is practical and suitable for a museum. This type of heating avoids the possibility of bursting or leaking pipes which could damage exhibits.

Wall surfaces should be free of convectors or radiators which would obstruct the use of walls for display purposes.

A complete air-conditioning is desirable, if not mandatory, to ensure proper humidity, heating, cooling, cleaning, and movement of air for the protection of collections and the comfort of the staff and visitors.

Proper air-conditioning, including humidity control, will impede or eliminate shrinking, warping, splitting, or cracking of materials. Damage to materials caused by fungus, mildew, mold, and corrosion can also be limited by creating conditions adverse to their growth.

Lighting

"Lighting in a gallery depends on the atmosphere sought to best show the material on display. ... this is the curator's responsibility provided the architect has included the proper equipment."(21:24) This statement certainly indicates the need for flexibility of lighting in the display areas.

Because of the fluctuations, uncertainties, and uncontrollable factors encountered with the use of natural light, this writer is of the opinion that artificial means of illumination should be used throughout all display areas.

General illumination of the display areas will always be required when setting up exhibits and, during building maintenance. The use of fluorescent tubes, with some type of diffusing panels to cut down glare, seems to be the most practical type of general overall lighting. Incandescent lighting, if used for general lighting, would tend to produce undesirable glare and reflections on the glass display cases. On the other hand, incandescent spotlighting can be put to very good use to illuminate paintings, photo panels, and other objects in the open. This type of lighting could be mounted on a track system to provide extreme flexibility.

To avoid reflections on the glass cases, the general illumination should be turned off when the lighting in the display cases is turned on.

Because of the deteriorating effects of ultra-violet rays emitted by fluorescent tubes, steps should be taken to absorb these rays. Special shields and diffusing panels are available for this purpose.

Electrical outlets, for display cases and other special lighting

effects, should be spaced around the walls and in a grid pattern in the floors.

Flexibility of lighting requires a complex switching system to control this lighting. It is important to be able to control each lighting unit independently of each other. Each spotlight and display case should have its own switch in addition to a master on-off switch. General illumination should be independent of any individual illumination and should be designed to provide varying levels of illumination as the need arises.

Lighting in areas other than display should provide adequate illumination and special effects as required. Fluorescent lighting would perhaps be the best choice for overall lighting, but this could vary from room to room depending upon its function.

Exterior lighting is a feature which should not be overlooked. With some imaginative planning, the exterior lighting of a building and its grounds, becomes an important contribution to the aesthetics of the site. Security and public safety can also be served by the use of exterior lighting.

Ceilings

Although there is not a specific type of ceiling which is considered to be ultimate, a ceiling free of distractions, such as large projections or deep recesses, should be used.

Suspended ceilings allow the inclusion of flush-mounted fluorescent lighting panels, but do not allow the use of spring-loaded pressure-poles to be installed between floor and ceiling, from which display panels may be hung. The space between the suspended ceiling and the

structural ceiling becomes an ideal location for electrical equipment, wiring, mechanical piping, and ductwork.

Whatever the choice of ceiling system and material, it is important that the one used be incombustible and have sound absorbing properties.

Walls and Partitions

Walls and partitions, in display areas, should be free of projections, recesses, and windows to provide unobstructed wall space for display purposes. Permanent walls should be fireproof and temporary walls should be constructed of materials which will inhibit the spread of fire.

Display room walls should be finished with a nailable, but incombustible material. A good and fairly inexpensive method is the use of burlap, or other coarse cloth material, chemically treated to resist combustion and bonded to plywood or other nailable panels.

Rather than finishing all of the walls with a nailable type finish, this writer suggests the use of individual nailable panels which can be locked into place where desired. This will provide a great amount of flexibility without the need of covering the entire wall surface. This method will also allow for change of texture and color on the walls.

An inset picture rail is very desirable and, in many instances, can be used in place of a nailable surface to hang pictures or similar type exhibits.

Walls should be designed free of any decoration, save some neutral color, which would distract the viewer's attention. On the other hand, areas such as lobbys, corridors, or meeting rooms could have special

feature walls to provide a distinct break from the display areas and also relieve the monotony which results when all walls are treated similarly.

Floors

Floor materials should preferably be resilient and resistant to damage from heels, wear, weight and movement of display cases, and be easily maintained. Color should be neutral, about in the middle of the value scale, to provide the curator flexibility in his selection of exhibit colors and to ease the job of cleaning up for the maintenance people.

As with walls, the introduction of different types and colors of flooring in special areas would help provide relief to the monotony of a single color.

Doors

Doorways to galleries should be of sufficient dimension to allow easy passage of display material and to prevent pedestrian congestion at entryways. Doors to storage areas should be fireproof to help reduce the spread of fire.

Provision for Handicapped Visitors

If a difference of height exists between the entrance and the approach, a ramp should be provided in addition to any steps. Because of the danger of icing, provision should be made to eliminate this hazard. Heating of the ramp and steps by means of some type of element embedded in the concrete provides a satisfactory answer to the problem

of icing.

If display areas are located on more than one level, an elevator should be provided in addition to stairways.

Fire Protection

Because of the excessive damage water can inflict to exhibit material, the use of fire hoses and overhead sprinklers is not recommended. Rather, an ample supply of CO_2 extinguishers should be provided at convenient points in the public and work areas and especially adjacent to, and in, the furnace room. A fire alarm and smoke detection system should be installed which would alert personnel, or the night security people, of impending danger.

Security

Two aspects of security have to be considered: 1. during the time the museum is open to the public and, 2. during the time the museum is closed such as evenings and holidays.

Security, during the time the museum is open to the public, must be handled with diplomacy for the number of museum visitors bent on theft or vandalism is very minor. However, even one person so inclined, can steal or ruin an item which might be irreplaceable. Therefore, some type of security to prevent this from happening must be employed. Several methods are possible and are as follows:

1. Provision of an area above the exhibition galleries from where the whole gallery may be observed at frequent intervals. Unless a specific person is assigned this responsibility, the job can easily be neglected. Also, if some trouble did occur, it would

be difficult for this person to apprehend the offender.

2. Museum personnel can be relieved of their regular duties during various times of the day allowing them to circulate through the galleries. This method provides several daily checks on the displayed items and also continual checks on the condition and cleanliness of the displays.

3. Museum guards can be employed to work in conjunction with either of the above or, can be the system of daytime security. This type of security system requires well trained men who should be able to cope with every type of anticipated incident. Many times just the sight of a "uniform" is enough deterrent to prevent theft or damage, but to rely on this deterrent alone would be foolhardy.

Security during the times the museum is closed from the public is an entirely different situation. The very minimum security system should include guards, armed or not. For a large museum, this system alone is not very satisfactory for even an alert guard can only be at one place at a time. A more efficient system employs the use of electronic equipment together with a guard or guards which are needed to respond to an alarm.

Should the reader be interested in the various types of electronic systems available, a pamphlet entitled "Security and the Museum" is included in Appendix A.

5. PROPOSED BUILDING PROGRAM FOR THE GLENBOW FOUNDATION MUSEUM

The building program proposed for the Glenbow Foundation Museum will be developed by the combination of research, observations, and interviews conducted by this writer together with recommendations outlined by the head curator and other personnel of the Foundation.

Several existing departments of the Foundation have been excluded from this building program, not because they are of lesser importance, but rather because they are of such a nature they have the potential of becoming an entity themselves or, that they can be located elsewhere to a greater advantage to themselves. This can be borne out by using the needs of the Military Department projected 50 years. A total area of approximately 310,000 square feet was the figure given this writer by the head of the Military Department.(23) This area certainly could justify a separate museum building to house collections relating only to the military.

The departments which are excluded are as follows:

1. Arts Department
2. Fine Arts Department
3. Military Department
4. Pioneer and Agriculture Department

It should be pointed out that although these departments have been excluded, a close working relationship should still remain between these departments and the departments to be housed in the proposed new building.

Presently, the Glenbow Foundation ocuppies approximately 150,000 square feet for all of its divisions.(10) A building of approximately 260,000 square feet was suggested to meet the needs of the Foundation for their anticipated expansion over the next 50 years.(10) It is apparent that if a building this size was constructed in the near future, portions of this building would be vacant or unused for some years to come. A more logical approach would be to design a smaller building which would satisfy current requirements, but allow for expansion when the need arises.

There are several advantages to this design approach:

1. In the event the 50-year need is found to be in error, the expansion can be adjusted to compensate for this error. The problem here would be to design the adjustment so functional relationships and aesthetic appearances are maintained and not destroyed.
2. Funds needed to construct the smaller building would be less than if the total complex was to be erected and, might be much easier to raise.

Disadvantages to this method are:

1. The building must be designed such that functional relationships operate smoothly and efficiently during the first stage of the complex and for this relationship to be maintained after expansion.

2. A more minor problem, but aesthetically important, is to design the smaller building so it is aesthetically pleasing and, after expansion this aesthetic value is maintained or enhanced.

For the purpose of this thesis report, an increase in area of 25% over the existing area will be assumed to satisfy current needs. This figure will be used to develop the initial building program and expansion will be allowed for in the design of the first stage as the need arises. In addition to the straight 25% increase, an additional 10,000 square feet will be added for a 300-seat auditorium and smaller seminar rooms and approximately 15,000 square feet will also be added to provide space for study and research laboratories. The study and research laboratories are needed due to the fact that approximately 75% of the material held by the Foundation, and other related institutions, are considered to be future research material.(10) Provision of a cafe will add another 4000 square feet over and above the 25% increase.

Using the above figures, a total area for present needs will be in the neighborhood of 216,000 square feet. This approximation will be the basis for the first stage building program.

Diagrams showing proposed personnel organization and functional relationships are shown on the following pages.

Figure 7 indicates a hypothetical personnel organization chart showing relationships within the Glenbow Foundation as this writer envisions the ultimate operation. This diagram in no way should be construed to be an actual personnel organization chart, either existing or proposed, of the Glenbow Foundation, but rather one which this writer has devised solely for the purpose of this thesis report.

The functional relationship diagram (Figure 8) is a common method used by architects in evaluating a building program. It provides a schematic plan indicating organization of areas and their relative placement as required by function. This provides the architect with a "thumbnail" idea of the building's requirements and it is used during the formation of the basic working plan.

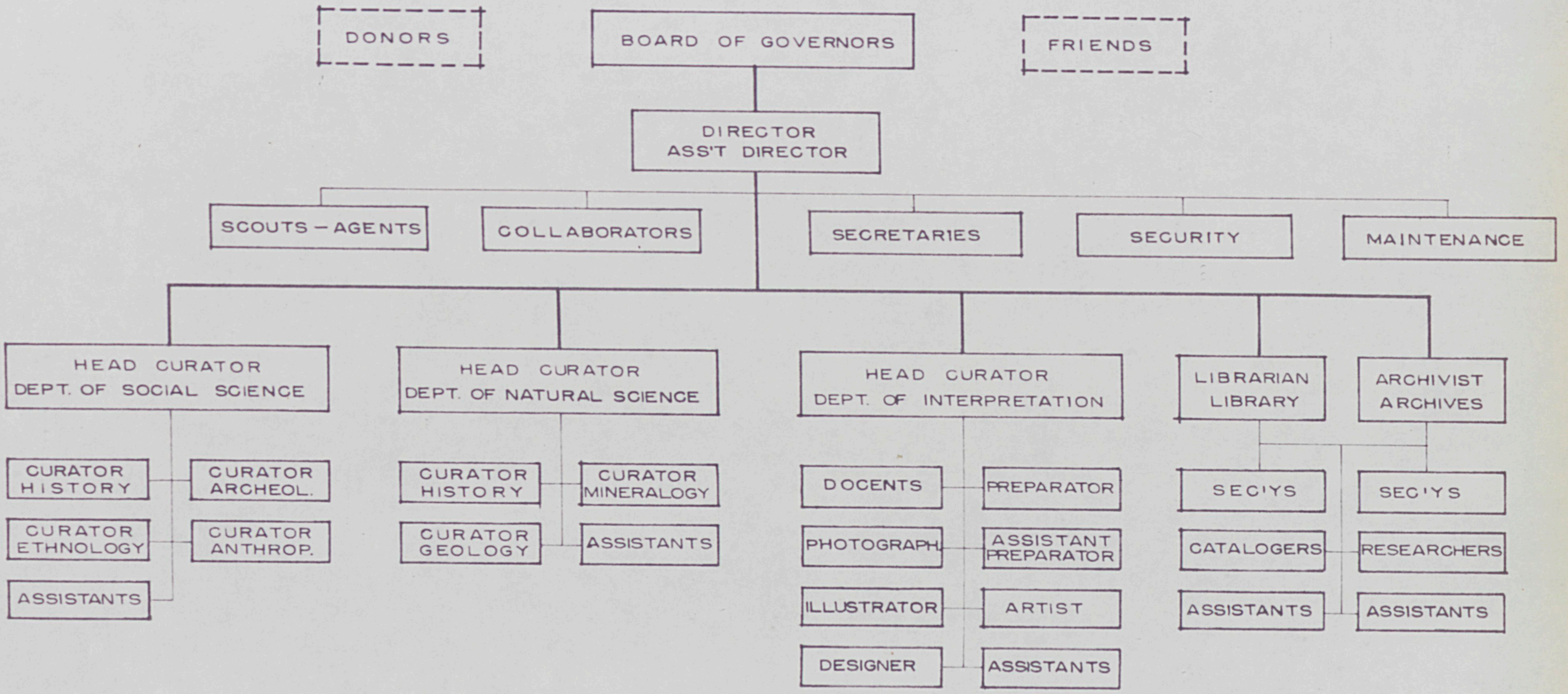


FIGURE 7. PROPOSED PERSONNEL ORGANIZATION FOR THE GLENBOW FOUNDATION MUSEUM.

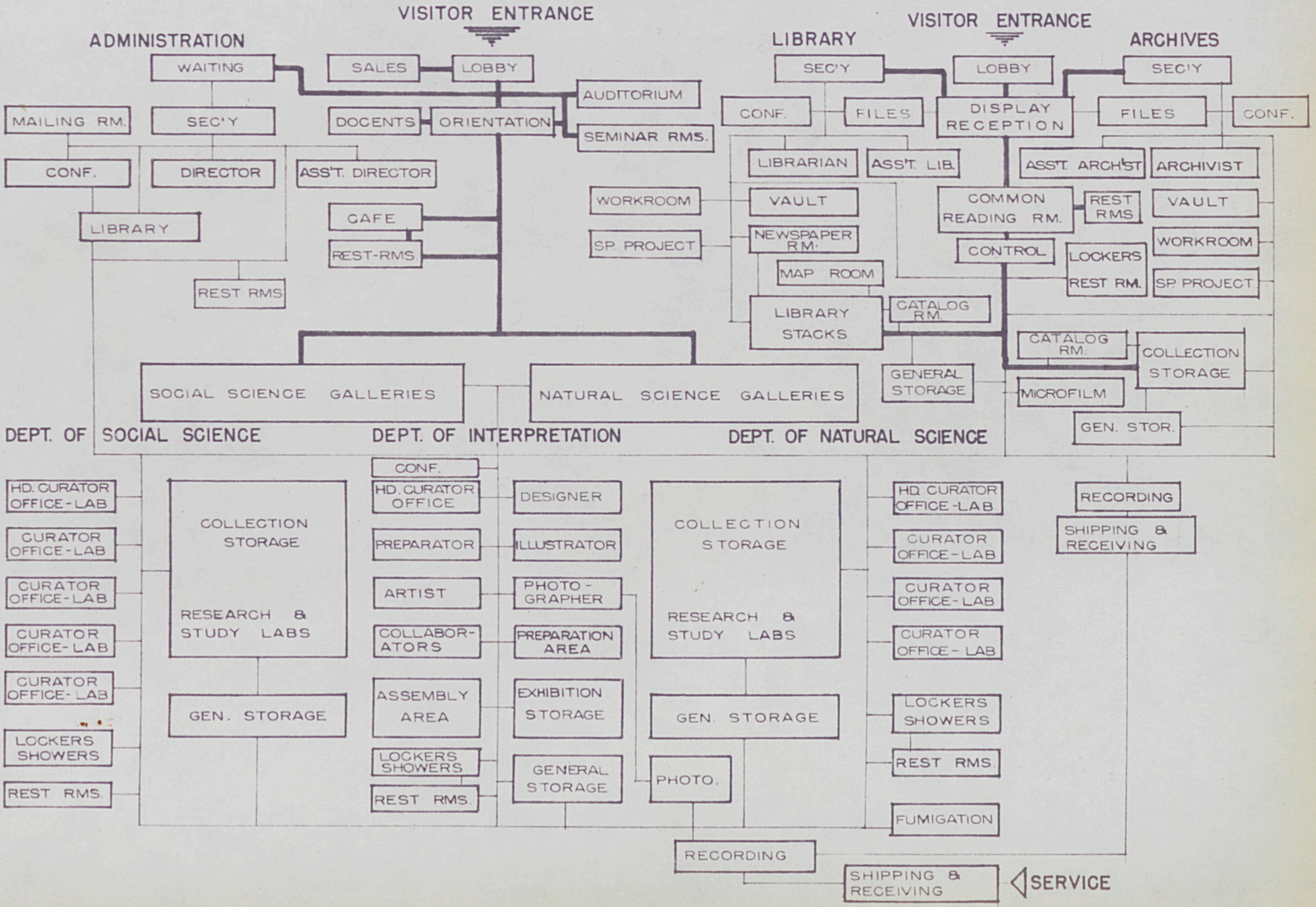


FIGURE 8. FUNCTIONAL RELATIONSHIP DIAGRAM OF PROPOSED AREAS — GLENBOW FOUNDATION MUSEUM.

GENERAL SPACE ALLOCATION

A breakdown of major areas included within the complex are as follows:

Exhibition	58,000
Storage and Laboratories	70,000
Administration	12,400
Lecture Halls	8,600
Cafe	4,000
Library and Archives	28,700
Shops and Maintenance	18,000
Circulation and Services	14,300
Mechanical Space	2,000
Total Net Area	216,000 square feet.

A more detailed breakdown is required for the design of the building. This breakdown will need to show relationships of required spaces; a general description of space functions; indication of any special equipment; and the number of square feet required.

This form of building program outline is similar to the one used by Harold C. Rose' for his proposed museum for the University of Florida.(21)

GLENBOW FOUNDATION MUSEUM, CALGARY, ALBERTA.

PROPOSED BUILDING PROGRAM OUTLINE

AREA NO.	DESCRIPTION	AREA REQUIRED
I	PUBLIC AREAS	
-1.	Lobby and Orientation	2,500
	Function-- Control of entrance area for all visitors; provide general information on the museum, its current exhibits, programs, purpose, and special facilities.	
	Equipment--Checking facilities and storage for parcels, electronic counting device, information desk, public telephones, and informal lounge facilities.	
	Relationship--Direct 2, 3, 4; indirect 5, 6, 7, 8, 16, 17, 18.	
-2.	Sales	300
	Function--Display and sales of books, periodicals, prints, slides, and related objects.	
	Equipment--Counter and display cases, cash register.	
	Relationship--Direct 1.	
-3.	Auditorium	5,000
	Function--Lecture demonstration requiring projection equipment; multi-purpose activities.	
	Equipment--Theatre seating for 300 persons; raised stage; permanent projection equipment; booth and storage.	
	Relationship--Direct 1; indirect 4.	
-4.	Seminar Rooms	1,200
	4 required	1,200
		600
		600

AREA NO.	DESCRIPTION	AREA REQUIRED
	Function--Lectures to small groups on special tour of museum; multi-purpose activities.	
	Equipment--Some type of projection equipment; chairs.	
	Relationship--Direct 1; indirect 3.	
-5.	Docent's Office	300
	Function--Preparation of gallery talks, guided tours, and lectures.	
	Equipment--Office furniture; storage space for research material, slides, and projection equipment.	
	Relationship--Direct I; indirect III.	
-6.	Cafe	4,000
	Function--Provision of refreshments to visitors and staff; light lunches, coffee, etc..	
	Equipment--Typical small cafe requirments; kitchen facilities, storage, and eating areas.	
	Relationship--Direct I; indirect III.	
-7.	Public Services	1,000
	Function--To provide rest rooms for museum visitors.	
	Equipment--As required by National Building Code.	
II	ADMINISTRATION	
-8	Reception and Waiting	300
	Function--Receiving persons wishing to see Director or Assistant Director.	
	Equipment--Seating, reading material storage, display cases, reception desk.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Relationship--Direct 9, 12; indirect 1, 10, 11.	
-9.	Secretarial Office	700
	Function--Stenographic, record and accounting functions for Museum.	
	Equipment--Two secretarial desks and chairs, filing cabinets, and other miscellaneous office equipment.	
	Relationship--Direct 8, 10, 11, 12.	
-10.	Director's Office	400
	Function--Individual and small group conferences and work space.	
	Equipment--Desk and chairs, bookshelves, files, work-table.	
	Relationship--Direct 9, 11, 12; indirect 8.	
-11.	Assistant Director's Office	350
	Function--Individual and small group conferences and work space.	
	Equipment--Similar to 10.	
	Relationship--Direct 9, 10, 12; indirect 8.	
-12.	Conference Room	600
	Function--Meetings of museum personnel and visiting dignitaries.	
	Equipment--Conference table, 14 chairs, display panels, bookshelves.	
	Relationship--Direct 9, 10, 11; indirect 13.	
-13.	Library	2,000
	Function--Storage of published mater-	

AREA NO.	DESCRIPTION	AREA REQUIRED
	ial of interest to museum personnel and researchers. Equipment--Bookshelves, reading tables and chairs. Relationship--Indirect II, IV, V, VI.	
-14.	Mailing Room Function--Service area for preparation of outgoing information. Storage of office supplies and records. Equipment--Work tables, reproduction machines, miscellaneous cabinets and shelves. Relationship--Direct 9.	500
-15.	Service Facilities Function--Staff restrooms Equipment--As required by National Building Code. Relationship--Used by personnel of administration department.	600
III	GALLERIES	
-16	Social Science Galleries Function--Presentation of collections relating to Archeology, Anthropology and Ethnology. Equipment--Exihibition area for large display cases, free standing exhibits,and display panels. Adequate direct and indirect lighting with conveniently placed electrical outlets. Relationship--Direct 1, IV.	38,000
-17	Natural Science Galleries Function-- Presentation of collections relating to Geology, Mineralogy and other	20,000

AREA NO.	DESCRIPTION	AREA REQUIRED
	fields related to Natural Science	
	Equipment--Similar to 16.	
	Relationship--Direct 1, V.	
-18.	Outdoor Display	
	Function--Display of exhibits which can be displayed outdoors. Also provides relief from monotony of indoor galleries. Could be in conjunction with cafe.	
	Equipment--Facilities for maintenance of the space, special lighting.	
	Relationship--Direct 1, 6; III (possibilities)	
IV	DEPARTMENT OF SOCIAL SCIENCE	
-19.	Head Curator-Office Laboratory	400
	Function--Routine administrative problems, research, and study.	
	Equipment--Desks and chairs, work-table, bookshelves, laboratory equipment, storage.	
	Relationship--Direct 16, and all internal sections; indirect II, VI.	
-20.	Curator's Office-Laboratories-Four Required	
	History	300
	Archeology	300
	Anthropology	300
	Enthnology	300
	Function--Research study area with space to confer with individuals or smaller groups, scholars.	
	Equipment--Similar to 19.	
	Relationship--Similar to 19.	
-21.	Collection Storage	33,000
	Function--Storage of material relating	

AREA NO.	DESCRIPTION	AREA REQUIRED
	to Social Sciences for use by museum for displays, and by scholars and researchers for study.	
	Equipment--Storage facilities for miscellaneous items-(shelves, cupboards, racks etc.)	
	Relationship--Similar to 19.	
-22.	Study and Research Laboratory	8,500
	Function--Provision of facilities for scholars to study and research items pertaining to the Social Sciences.	
	Equipment--Storage facilities, laboratory equipment.	
	Relationship--Similar to 19.	
-23.	Service Facilities	1,000
	Function--Provision of restrooms, lockers and showers for staff.	
	Equipment--As required by National Building Code.	
	Relationship--Used by personnel of Social Science Department.	
V	DEPARTMENT OF NATURAL SCIENCE	
-24.	Head Curator-Office-Laboratory	400
	Function--Similar to 19.	
	Equipment--Similar to 19.	
	Relationship--Direct 17,and all internal sections; indirect II, VI.	
-25.	Curator's Office-Laboratories-Three required	
	History	300
	Geology	300
	Mineralogy	300
	Function--Research study area with space	

AREA NO.	DESCRIPTION	AREA REQUIRED
	to confer with individuals or small groups, scholars.	
	Equipment--Similar to 19.	
	Relationship--Similar to 24.	
-26.	Collection Storage	22,000
	Function--Storage of material relating to Natural Sciences for use by museum for displays, and by scholars and researchers for study.	
	Equipment--Similar to 21.	
	Relationship--Similar to 24.	
-27.	Study and Research Laboratories	6,500
	Function--Provision of facilities for scholars to study and research items pertaining to the Natural Sciences.	
	Equipment--Similar to 22.	
	Relationship--Similar to 24.	
-28.	Service Facilities	700
	Function--Similar to 23.	
	Equipment--Similar to 23.	
	Relationship--Used by personnel of Natural Science Department.	
VI	DEPARTMENT OF INTERPRETATION	
	General- This department is responsible for preparing and presenting the museum's programs.	
-29.	Head Curator's Office	350
	Function--Facilities for the administration of all projects and personnel in the department.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Equipment--Desk and chairs, work tables, drafting tables, miscellaneous storage facilities.	
	Relationship--Direct all internal sections; indirect II, III, IV, V.	
-30	Conference Room	400
	Function--Provision of space for meetings between staff of the three Departments for planning and operations. Also for meetings with individuals and multi-purpose uses.	
	Equipment--Conference table, ten chairs, miscellaneous storge facilities, and some visual-aid equipment.	
	Relationship--Direct 29; indirect IV, V.	
VI-A	PROFESSIONAL TECHNICANS STUDIOS	
	General- Exhibition projects of all sizes are designed and fabricated in this area. Personnel is highly skilled and require specifically designed space and equipment. Staff need individual spaces which to concentrate and a common space in which to assemble the final product.	
-31.	Preparation Shop	2,500
	Function--A well equipped carpentry shop for production of cases and background material.	
	Equipment--Miscellaneous hand and power tools common to a carpentry shop. Also a finishing area complete with paint booth and exhaust fan.	
	Relationship--Direct 38; indirect VI-A.	
-32.	Preparation Studio	1,000
	Function--Operation similar to a well organized kitchen with similar equip-	

AREA NO.	DESCRIPTION	AREA REQUIRED
	ment. All reproductions, models, castings, mouldings, or any other operation which requires preparation. Taxidermists and dioramists work in this space. Equipment--Stove, deep-freeze, sink, gas, compressed air, water. Cabinets and storage bins for raw materials, work tables, handtools, some power equipment, small paint booth with exhaust fan. Relationship--Similar to 31.	
-33.	Designer's Studio Function--Production of drawings for exhibit design. Typical drafting room activities. Equipment--Drafting table, work table for model building, miscellaneous storage facilities. Relationship--Similar to 31.	400
-34.	Illustrator's Studio Function--Production of exhibit labels and descriptions, charts, graphs, etc. Equipment--Drafting table, work table, layout table, miscellaneous storage facilities. Relationship--Similar to 31.	400
-35	Artist's Studio Function--Production of all art requirements, reproductions and illustrations. Equipment--Drafting table, easels, scaffolds, and miscellaneous storage. Relationship--Similar to 31.	400

AREA NO.	DESCRIPTION	AREA REQUIRED
-36	Photographic Studio	2,000
	Function--Complete photographic process including developing, printing, etc.	
	Equipment--All items and spaces found in a typical photographic studio. Miscellaneous storage.	
	Relationship--Direct 38, 42; indirect VI-A.	
-37	Collaborators Offices - Two required.	400 400
	Function--Areas reserved for visiting researchers and consultants.	
	Equipment--Desk and chairs, worktables, bookshelves, laboratory bench and equipment, and miscellaneous storage.	
	Relationship--Direct IV, V.	
-38	Assembly Area	4,000
	Function--Final assembly point of all sub-assemblies.	
	Equipment--Layout tables, electrical outlets for tools and lighting tests.	
	Relationship--Direct VI-A, 42.	
-39	General Storage	800
	Function--Storage area for miscellaneous materials such as lumber, shipping crates, etc.	
	Equipment--Storage racks.	
	Relationship--Direct 31.	
-40	Exhibition Storage	1,000
	Function--Storage area for completed exhibits awaiting display space.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Equipment--Shelving, maximum security.	
	Relationship--Direct III.	
-41	Service facilities	1,000
	Function--Restrooms, lockers, and showers for staff of this department.	
	Equipment--As required by the National Building Code.	
	Relationship--Used by personnel of the Department of Interpretation.	
VII	GENERAL SERVICES	
	General--Space allocated for shipping and receiving, maintenance, and general storage.	
-42	Shipping and Receiving Room	3,000
	Function--Inspecting incoming and final packing of outgoing materials.	
	Equipment--Workbench, power and hand tools.	
	Relationship--Direct VII.	
-43	Loading Platform	
	Function--Access to shipping and receiving room.	
	Equipment--Protection from weather for items during transfer to and from trucks.	
	Relationship--Direct 42; indirect 40, 44, 45, 48.	
-44	Recording and Inventory Office	500
	Function--Contains records of all material moving through the museum. Each item is cataloged and inventory periodically taken.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Equipment--Desk and chairs, filing cabinets. Relationship--Direct 42; indirect remainder of VII.	
-45	Fumigation Room	200
	Function--Decontaminate incoming materials and materials housed in the museum. Equipment--Tightly sealed openings, fumigation equipment, and exhaust to outdoors. Relationship--Direct 42; indirect all portions of the museum.	
-46	Exhibition Storage	800
	Function--Area designated for storage of exhibits awaiting shipment. Equipment--Shelving and maximum security. Relationship--Direct 42.	
-47	Security Office	300
	Function--Responsibility of security of all collections of museum, library, and archives. Equipment--Electronic detection systems. Relationship--All portions of building and police and fire departments.	
-48	General Storage	3,000
	Function--Organized area for storage of material used in various portions of the museum. Equipment--Shelving.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Relationship--Direct VII.	
-49	Janitorial Services	700
	Function--Facilities and storage of materials for janitorial personnel.	
	Equipment--Storage shelves, racks, miscellaneous cleaning equipment.	
	Relationship--All portions of the building.	
-50	Service Facilities	400
	Function--Rest rooms and lockers for personnel working in general service area.	
	Equipment--As required by the National Building Code.	
	Relationship--Indirect VII.	
VIII	LIBRARY	
-51	Librarian's Office	300
	Function--Individual and small group conferences and work space.	
	Equipment--Desk and chairs, shelves, files, work-table.	
	Relationship--Direct 52, 53, 54.	
-52	Assistant Librarian's Office	250
	Function--Similar to 51.	
	Equipment--Similar to 51.	
	Relationship--Direct 51, 53, 54.	
-53	Secretarial Office	500
	Function--Stenographic and records of functions of Library.	
	Equipment--Secretarial desks and	

AREA NO.	DESCRIPTION	AREA REQUIRED
	chairs, filing cabinets, and other general office equipment. Relationship--Direct 51, 52, 54, 55, 74.	
-54	Conference Room	500
	Function--Meetings of Library personnel or other individuals or groups. Equipment--Conference table, 10 chairs, display panels. Relationship--Direct 51, 52, 53.	
-55	File Room	300
	Function--Complete files on all material housed in Library. Equipment--Table and chair, file cabinets. Relationship--Direct 74, 75.	
-56	Workroom	300
	Function--Miscellaneous tasks relating to library operations. Equipment--Work-tables and chairs, storage facilities. Relationship--Indirect VIII.	
-57	Special Projects Room	300
	Function--Used by special researchers and students. Equipment--Several desks and chairs, work-tables, shelving. Relationship--Indirect VIII	
-58	Vault	300
	Function--Storage of rare and	

AREA NO.	DESCRIPTION	AREA REQUIRED
	valuable items. Equipment--Maximum security and must be fireproof. Relationship--Indirect VIII.	
-59	Newspaper Room Function--Storage of newspapers of historical value. Equipment--Shelves for storing newspapers flat, work-tables. Relationship--Direct 61, 75; indirect VIII.	500
-60	Map Room Function--Storage of historical maps. Equipment--Facilities for storage of maps. Also work-tables. Relationship--Direct 61, 75; indirect VIII.	500
-61	Library Stack Room Function--Storage of books collected by the Foundation. Equipment--Bookshelves, reading tables, chairs. Relationship--Direct 75; indirect VIII.	10,000
-62	Cataloging Room Function--Cataloging of all materials housed in Library. Equipment--Tables, chairs, file cabinets. Relationship--Direct 61; indirect VIII.	500
IX	ARCHIVES	

AREA NO.	DESCRIPTION	AREA REQUIRED
-63	Archivist's Office	300
	Function--Individual and small group conferences and work space.	
	Equipment--Desk and chairs, shelves, filing cabinet.	
	Relationship--Direct 64, 65, 66.	
-64	Assistant Archivist's Office	250
	Function--Similar to 63.	
	Equipment--Similar to 63.	
	Relationship--Direct 63, 65, 66.	
-65	Secretarial Office	500
	Function--Stenographic and records of the functions of the Archives Dept.	
	Equipment--Similar to 53.	
	Relationship--Direct 63, 64, 66, 67, 74.	
-66	Conference Room	500
	Function--Meetings of Archives personnel or other groups.	
	Equipment--Similar to 55.	
	Relationship--Direct 63, 64, 65.	
-67	File Room	300
	Function--Complete files on all material housed in Archives Department.	
	Equipment--Similar to 55.	
	Relationship--Direct 74, 75.	
-68	Workroom	300
	Function--Miscellaneous tasks	

AREA NO.	DESCRIPTION	AREA REQUIRED
	pertaining to Archives operations.	
	Equipment--Similar to 56.	
	Relationship--Indirect all of IX.	
-69	Special Projects Room	300
	Function--Similar to 57.	
	Equipment--Similar to 57.	
	Relationship--Indirect IX.	
-70	Vault	300
	Function--Storage of rare and valuable items.	
	Equipment--Similar to 58.	
	Relationship--Indirect IX.	
-71	Collection Storage	5,000
	Function--Storage of all material held by Archives Department.	
	Equipment--Miscellaneous filing cabinets, cupboards, shelving, etc.	
	Relationship--Direct 75; indirect IX.	
-72	Cataloging Room	500
	Function--Cataloging of all material housed in Archives Department.	
	Equipment--Similar to 62.	
	Relationship--Direct 71, 75.	
X	FACILITIES SHARED BY LIBRARY AND ARCHIVES	
-73	Lobby	300
	Function--Control of entrance area for all visitors.	

AREA NO.	DESCRIPTION	AREA REQUIRED
	Equipment--Checking facilities, public telephones, informal lounge facilities. Relationship--Direct 74.	
-74	Display and Reception Area	500
	Function--Provides display space for items housed by Library and Archives. An information and control point. Equipment--Display cases and panels, secretarial desk and chair, some seating. Relationship--Direct 55, 67, 75; indirect 53, 65.	
-75	Common Reading Room	2,000
	Function--Used by visitors and researchers to study and read material housed in Library-Archives Department. Equipment--Miscellaneous reading tables and chairs. Some display panels. Relationship--Direct 61, 71, 74; indirect VIII, IX.	
-76	Public Services	500
	Function--Provision of rest rooms for visitors. Equipment--As required by National Building Code. Relationship--Direct X.	
-77	Staff Service Facilities	1,000
	Function--Provision of rest rooms and lockers for Library-Archives staff. Equipment--Lockers and as required by National Building Code. Relationship--To all personnel of Library-Archives Department.	

AREA NO.	DESCRIPTION	AREA REQUIRED
-78	Micro-filming	200
	Function--Provision of this service is required for record keeping.	
	Equipment--Micro-filming equipment. Could work in conjunction with 36.	
	Relationship--Indirect all of Library-Archives, 36.	
-79	Shipping and Receiving Room	600
	Function--Similar to 42, but pertaining only to Library-Archives.	
	Equipment--Worktable, chairs, miscellaneous storage.	
	Relationship--Direct 42, 80.	
-80	Recording and Inventory Office	100
	Function--Contains records of all material housed in Library-Archives. Maintains record of all incoming and outgoing items.	
	Equipment--Desk and chairs, filing cabinets.	
	Relationship--Direct 42, 79.	
XI	STAIRS, CORRIDORS, MECHANICAL ROOM	10,000
	TOTAL NET SQUARE FEET	216,350

6. A E S T H E T I C S

Aesthetics, depending upon the individual using the term, can be interpreted in various ways. To some it can be philosophical and subject to much debate; to others it is more basic, still philosophical because it is an interpretation, but can be presented in simple, logical terms. An attempt to approach the subject of aesthetics from the basic standpoint will be the one used by this writer.

Considerations to be discussed will include the surrounding environment, building forms or massing, materials to be used, visual impressions, and economics.

Surrounding Environment

Rather than discuss an actual site, in terms of environment, a general discussion which can apply to any site will be used.

Consideration to the environment of the site should be considered mandatory. It is true that if a "monument" is to be erected, complete disegard of the environment will tend to make this "monument" stand out, but this approach should not be taken unless we all wish to become monument builders. Eventually, it would be conceivable that no one building would be a monument because it will be surrounded

by buildings all of which are "monumental".

The more logical approach, would seem to be to design the building, or whatever, to relate to its surroundings. The building can contrast, or be in harmony with the site. That is to say, the building may appear to grow from the earth itself or, it may appear to be just placed on the site or even somewhat separated from it. Certain building types lend themselves to one method of relationship more so than to the other method.

To say the reverse, the site may contrast the building or be in harmony with the building, is possible depending upon which side of the dividing line, if one exists, we choose to look from.

The importance of this consideration is in the awareness and regard of the environment, and the means by which one can achieve a desirable relationship.

Materials to be Used

A museum, by its nature, seems to imply a building which should stand forever, or at least not give the appearance of being "temporary".

The materials which give an impression of being everlasting are those which relate to stone. We need only to look at the great pyramids of Egypt, the temples of Greece and Rome, or to the cathedrals of Europe to visualize this.

Modern techniques have produced many types of "man-made stone", but most of these appear to be artifical facades and not really everlasting. Concrete, however, can be considered to be everlasting and perhaps should be the material to use. A combination of stone from the earth and concrete, man-made stone, blended together might

be the answer.

Interior materials should be rich, but not flashy; dignified; and durable. Too many different materials should not be used, but rather a conservative choice of materials which will harmonize and contrast, to a certain extent, to produce a blending of the internal environment.

Building Forms

Functions inside the building will dictate the forms or massing of the building to a great extent. Many times, architects hide or disguise masses which result from function. This usually results in box-like, unattractive shapes which may function beautifully on the inside, but are dormant on the exterior.

Using the sun to cast everchanging shadows, from projections, recesses, and changes in planes, provides visual delights employing nature as a designer. These projections, recesses, and plane changes can result from functional requirements within the building being expressed on the exterior and, therefore, do not need to be appliques.

The forms and massing should be pleasing, simple, and inviting to the viewer and not be such that they tend to humble or frighten him away. These forms should also communicate that this building is a museum, a "source of inspiration", and not a mausoleum or a department store.

Visual Impressions

Visual impressions will be determined by the mood and character presented by the combination of the first three considerations. Each one of these considerations has a visual impression of its own, but

all have to be brought together to provide the total impression. A successful combination of the three should produce a visual image which will be inviting, pleasing, dignified but yet humble, and in character with the function of the building.

Economic

This consideration will, to a great extent, determine the degree of achievement which will be reached in the first four considerations. The amount of site improvement will depend upon the allotted funds available for this aspect. Budget will determine the kinds of materials which can be used. "Good-quality" materials are certainly more expensive than "average-quality" materials. The method of construction and structural system enabling the expression of functions on the exterior will also be determined by budget requirements.

Perhaps we are very fortunate the Pharaohs of Egypt did not have to worry too much about economics. If they had, would we today, some 5000 years later, still be able to marvel at the sight of their pyramids?

7. COST ANALYSIS

Means of financing the construction costs for this proposal are beyond the scope of this report and will not be dealt with except for stating that such means will be under the direction of the Board of Governors of the Glenbow Foundation.(17) This is also true with regard to the operating costs that will be encountered.

Both sites being considered are, or shortly will be, owned by the City of Calgary. It is assumed that some type of agreement between the City of Calgary and the Glenbow Foundation can be negotiated to allow construction of the museum on either location. For this reason no estimate to the cost of either site will be made. The final site will be chosen by determining the advantages of one over the other. This choice will be made during the early design stages following the submission of this report.

An estimate of building construction and site improvement costs will be the main concern of this section of the report.

BUILDING CONSTRUCTION COSTS

In general. there are three basic methods of estimating building

costs which can be employed at this point of the design. These are as follows:

1. Square-foot Cost Method. This method involves the determination of a per-square-foot cost of a typical museum, or similar building type, and applying this figure to the total floor area of the building being estimated.
2. Cubic-foot Cost Method. In this method, the total volume of the building is determined and a cost per cubic-foot of a typical museum, or similar building, is found and then multiplied by the total number of cubic feet within the building being considered.
3. Segregated Cost Method. Here, the costs of the various components which make up the total building are calculated separately, until all parts have been accounted for, and are then added together to determine the total construction cost. This method is the most exacting, but is also the most difficult. During early design stages, too many unknowns exist to take advantage of this method and, therefore, should only be used when the design of the building is nearing its final stages.

The square-foot cost method will be used in this report owing to the fact most of the information presently available, with regard to the building, is in terms of square feet. The source of cost information will be the Marshall Valuation Service estimating handbook.(16)

Included in the square-foot cost are architect's and engineering fees, contractor's profit and overhead, permits, and other miscellaneous costs.

Although museum buildings are not listed specifically, a category of "good, class-B public building" will be used as an equivalent. A brief description of this building type includes the following:

1. Construction: reinforced concrete columns and beams; floors and roofs of concrete, or concrete covered steel decks--fireproofed.
2. Exterior walls: special architecture, good metal and glass. face brick, stone, concrete.
3. Interior finish: best plaster, terrazzo and vinyl floors.
4. Lighting, plumbing, and mechanical: high-level lighting, audio-visual wiring, good plumbing.
5. Heating: zoned air-conditioning.

Deviations from this description, if not too great, can be made without any major change of base cost.

The cost for this category is listed as $26.33 per square-foot based on an average height of 12 feet. (16: Sect. 15, page 11) If the average height is more than the base height, a multiplier needs to be applied to the base square-foot cost. The following tabulation lists the multipliers for several average heights:(16: Sect. 15, page 12)

Height (ft.)	Multiplier
14	1.046
16	1.092
18	1.138
20	1.184

An average height of 16 feet will be used for this estimate.

Because of possible temperature drops to -30°F, an additional $0.90 per square foot must be added to the base cost.(16: Sect. 15, page 12)

In addition, three other multipliers need to be applied to the resulting figure above. These are:

1. Floor area-perimeter multiplier. This takes into account the variation in proportion of exterior wall perimeter to floor area. For this building, an interpolated value of 0.850 will be used as the multiplier.(16: Sect. 15, page 13)
2. Current cost multiplier. This multiplier is revised monthly and reflects fluctuations in construction costs. For February 1967, the current cost multiplier for western regions stands at 1.00.(16: Sect. 99, page 3)
3. Local multiplier. This multiplier makes an adjustment of current local fluctuations in construction costs. In Calgary, for February 1967, the multiplier is 0.96.(16: Sect. 99, page 5)

Applying all of these refinements to the base cost, a final figure of $24.24 per square foot is obtained. This figure can now be used to estimate the building cost.

The estimated building area is approximately 216,350 square feet, therefore, the cost of the building will be approximately $5,244,324.00, not including site improvement costs.

To estimate the cost of site improvements, more detailed information would be required than is available at this time. Many of these details will not be available until the actual design of the building and site has been started and is nearing completion. A breakdown of individual costs of site improvement is included in this report which gives an indication of costs of various items relating to site improvement.

At this point, a single level building is envisioned, therefore,

the need of elevators is not anticipated. If, however, a scheme is developed which has more than one level, the cost of elevators, both public and freight, will have to be included in the estimate.

SITE IMPROVEMENT

Whichever site is finally selected, landscaping will be an important aspect of the total design.

The following tabulation indicates the estimated average costs of items related to landscaping:(16)

Excavation (per cu. ft.)	$0.08
Fill (per cu. ft. of compacted earth)	0.09
Site grading (per sq. ft. of site)	0.06
Lawns (per sq. ft.)	0.06
Lawn sprinkling system (per sq. ft. of lawn)	0.08
Walks (reinforced concrete, per sq. ft.)	0.45
Paved asphalt roads (per sq. ft.)	0.29
Paved asphalt parking (per sq. ft.)	0.29

Trees and shrubs will vary in price depending upon type, size, and number.

Exterior lighting costs of the site will also vary depending upon type and size and, can range from $60 to $100 per unit. If a streetlight type unit is to be used the cost will be around $600 per unit.

8. SUMMARY

During the design stages of this thesis problem several points were found to need some revision from original thoughts. This writer will briefly outline these changes together with reasons why certain decisions were made.

1. Selection of Site

Prince's Island was selected as the building site for several reasons. Perhaps the two most important reasons were the natural, park-like and pleasant setting of the island as compared to the barren Urban Renewal site and the fact that the actual area which was finally reserved for a museum in the renewal site was much too small and would have required a six or seven story building.

2. Building Design

Originally it was intended to house all of the facilities of the Museum and Library-Archives on one level. However, this thought was abandoned due to the very large area this would have required and most likely would have overwhelmed the island. For this reason the building was divided into three levels: collection storage,

study and research labs, and the Department of Interpretation on the lower level; administration, galleries, lecture rooms and auditorium, and shipping and receiving areas on the ground level; and the Library-Archives located on the second level.

Another problem which came about due to the large size of this building was one of massing. For this reason, the final plan was devised to break-up the long linear aspect of the building to give the appearance of several buildings tied together.

Future expansion should not pose any problems due to the nature of the design which will allow expansion without destroying the massing of the present building. Since there is not any formal balance or symmetry to the building, an addition of one or more galleries, or whatever, can easily be added on in one or several locations as required.

A large discrepancy exists between the estimated total area and the total area shown on the plans. This was caused by a gross under-estimation, by this writer, of areas for corridors, lobbies, lounges, and the central court. When this discrepancy was first noted, investigation found that the main areas such as administration, galleries, auditorium and lecture rooms, shipping and receiving, collection storage, study and research labs, Department of Interpretation, and service facilities were very close to the estimated areas whereas the former mentioned areas were very much over the estimated. On consultation with my advisor, Mr. Wm. Carver, both he and I agreed that although the discrepancy was in the neighborhood of 85,000 square-feet, the area as designed on the final presentation is warranted for a building of this size and nature.

3. Selection of Materials

The criteria used for the selection of materials were simple and logical. The material should be handsome, yet bold for the site; one which does not give the impression of a false facade; and finally one which possibly could incorporate the finish surface with the structure.

This designer chose concrete as the basic material for structure and finish. The exterior walls will be rough form-board texture with some surfaces receiving special treament such as hammered ribs to expose the aggregate and produce a very rough texture. Interior walls will receive similar treatments and in addition, some walls will be plastered or finished with other special coverings depending upon use and location.

Floors throughout the building will be terrazzo with the exception of the administration area, Library-Archives, auditorium, and the various lounges which will be broadloomed.

For the most part, ceiling will be a dropped system incorporating a ventilating system within the ceiling area. Other ceiling areas will be exposed, revealing the structural concrete joists or waffle-slabs as the case may be.

Dark stained wood will be used where possible throughout the building to accent the walls and floors.

4. Conclusion

It is hoped by this designer that by the break-up of spaces into various sizes from small, tight corridors to large open courts and by interesting use of materials, the visitor will enjoy

a variety of experiences as he walks through the building. This, together with the use of exterior courts, is hoped to prevent museum fatigue from occuring and should keep the visitor refreshed as he proceeds on his journey throughout the museum.

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A P P E N D I X A

Supplementary Information on Security.



SECURITY AND THE MUSEUM

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e journal of the American Association of Museums
ashington, D. C. 20008

1. *Plan for security in advance,* preferably at such time when exhibits are being designed, when spaces or buildings are to be renovated, or during planning for new construction. This advance planning pays off in better installations, concealment of devices and improved appearance.

2. *Evaluate* the security problems carefully.

3. *Consider* the use of protection equipment where conditions indicate it is practical to do so.

4. *Encourage* full cooperation and participation of all museum personnel in the security function.

5. *Review* the security provisions regularly, taking into account any changes that may have developed and adjust accordingly.

6. *Seek* special assistance on difficult problems or new applications for equipment. Make test installations to evaluate results on a small scale.

Remember—management gets only what it "inspects" and not what it "expects." There is no substitute for careful attention to all details in security activities. ❖



Electronic Eyes and Ears

ON GUARD

by Tom Probst

Museum security continues to rank high on the list of museum concerns, and today's electronic industry is rushing to fill the needs. Mr. Probst, discusses many electronic security systems available on the market, what they will and will not do, and approximate costs

From a larcenous standpoint, the average museum makes a tempting target. It's open to anyone on a regular basis, with its most priceless possessions right out on open display. Plagued by low budgets, all too many museum directors must rely on occasional guards and visitors' consciences. Thieves are welcome to "case" the museum during the day and return at night to haul off what they like.

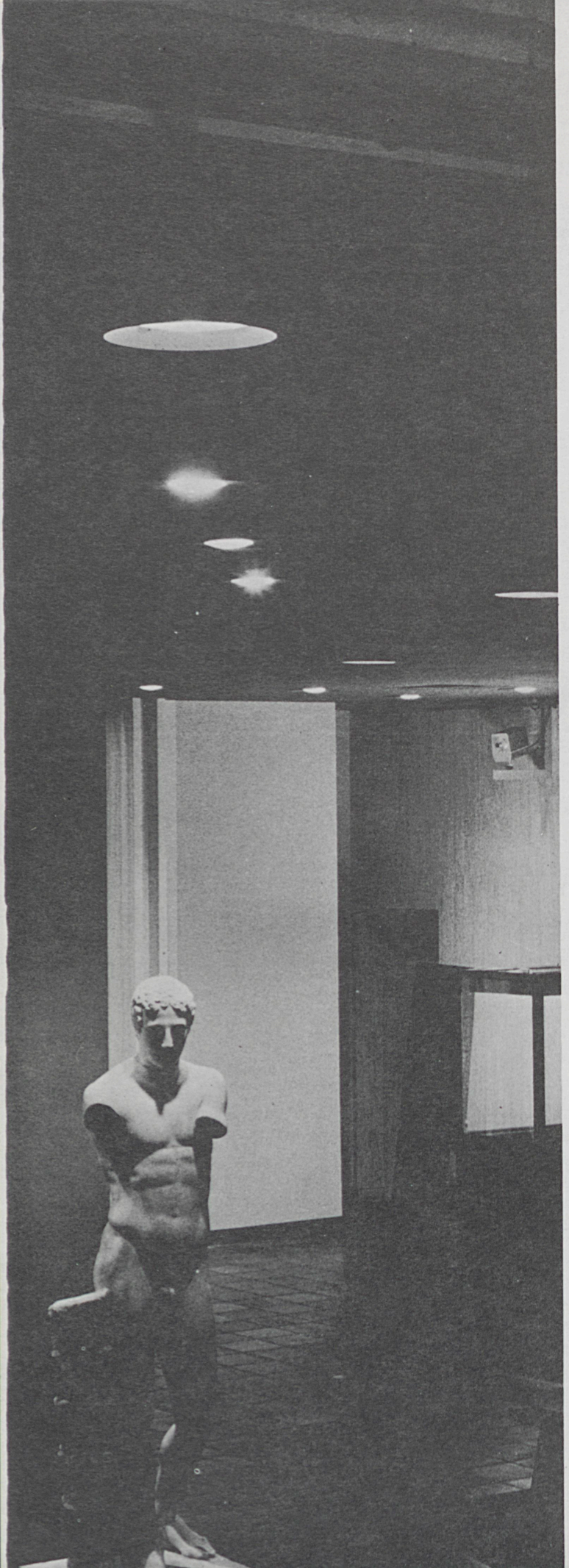
Unfortunately, the thieves are getting more knowing, in both art and artifice. Evidence indicates the underworld is taking an interest in art, with cultural aspects reinforced by the fact that most art objects are both portable and valuable. Since so few pieces are for sale, the criminals simply steal what they want. And with most of the wanted objects in museums, museums are prime targets for thefts.

For protection, many museums rely on periodic patrols by a guard force—all too often elderly men who are no match for a clever gang of sophisticated crooks. The guards are usually backed up by the local police force—providing they're still in condition to turn in an alarm.

But even an alert guard provides surveillance at only one point. A roving patrol gives surveillance at many points, but not continuous surveillance. After the patrol has passed by there are periods—long periods—when a gallery is entirely without protection. So while a guard may give excellent protection while he's in one place, he simply can't stay in one place very long. A patrol making one round every hour may spend only two minutes in any one gallery. This means that gallery is entirely unprotected for the next fifty-eight minutes.

Faced with the problem of large catacomb-like areas to watch, tempting valuables on display and sievelike security methods, many museum administrators are turning to electronic devices which are a good deal less expensive than a guard, always on the job and cannot be led into temptation.

Electronic security can save money two ways: first, by cutting intrusion losses and dangers;



second, by providing better protection with fewer guards.

No matter how deftly engineered or well installed, however, a security system only supplements—it doesn't supersede—a guard. With even the most elaborate security system someone still must respond to an alarm.

The first step in selecting a security system is to decide how much of the museum is to be protected. Generally the entire building—administration section, museum offices, galleries—should be kept under constant surveillance.

Alarms should feed into a central console at a guard station. When an alarm comes in, a guard can be dispatched to check on the trouble. The alarms should, of course, be zoned. Otherwise an alarm would simply indicate that someone was in a protected area but not show where. The guard would have to check every entrance, every gallery —and by that time the intruder would be long gone.

Satellite alarm panels at the local fire and police stations can give additional protection by "guarding the guard." If a guard doesn't send back an "all clear" within, say, two minutes after the initial alarm, a second alarm goes on at the satellite panel, bringing additional help.

In a museum a central console can include more than security alarms. It can keep an electronic eye on mechanical equipment, signaling immediately if anything goes wrong with fans, pumps, valves. By bringing control of mechanical equipment right to the guard's fingertips, the panel enables him to keep watch over the entire museum from one point.

One of the greatest benefits of a security system is psychological. Even an intrepid band of art thieves, knowing a museum is protected by an ever-alert electronic system, will almost certainly avoid it. Employees should be told of the system and how it works: This information alone is often a powerful deterrent.

Of all the security systems, the simplest is a fence.

A fence offers more of a psychological than a physical hindrance. Its very presence, however, may discourage an intruder from trying to get in.

Other than serving as a somewhat ornamental deterrent, a fence has almost no value as a security system. Given time and secrecy, a determined burglar can go over, under or through any fence readily. But a fence may delay an intruder until another person happens on the scene. And it can be teamed with detection devices to signal when an intruder is trying to get through.

For example, the fence might include a taut wire system. When anyone touches or cuts this wire, an alarm is sounded at a central console or

guard post. But the intruder is completely unaware that guards have been tipped off until they close in.

For adequate protection, a fence should not stand alone but should be combined with other form of detection and be backed up by a guard force.

Audio detection

Essentially, an audio-detection system is a long-range hearing aid, enabling a guard at a remote location to hear a prowler moving around in a protected area or trying to get in. When it "hears" anything unusual—foot-falls, canvas ripping, a door closing—it turns on an alarm at the central console. There the guard simply flips a switch on the control panel to listen in on the area. Systems are available from Honeywell, ADT and Mosler Safe Company.

Essentially, an audio system consists of microphones in the protected area, a speaker at a guard station and wires connecting the two. The number of microphones needed to protect a given area depends on the range and sensitivity of the mikes and the physical aspect of the area itself. Filters cut out extreme high- and low-frequency noises for better detection.

Because such a system detects unusual noises, it can work only when the background noise level is comparatively low and continuous. If the ambient noise level is too high, sounds of a burglar at work would be drowned or masked by background clatter.

Sensitivity can be set so an audio-detection system will pick up even the hushed catlike steps of a stealthy intruder. But too much sensitivity is a handicap—the system would turn in alarms for a clap of thunder, clatter of a passing truck, or rumble of a low-flying plane.

The advantages of an audio-detection system are many. It is inexpensive—a complete system can be bought for $600. It detects not only the intruder trying to get in but the stay-behind as well. One system even combines a pickup microphone with a loudspeaker so guard personnel can talk back and forth.

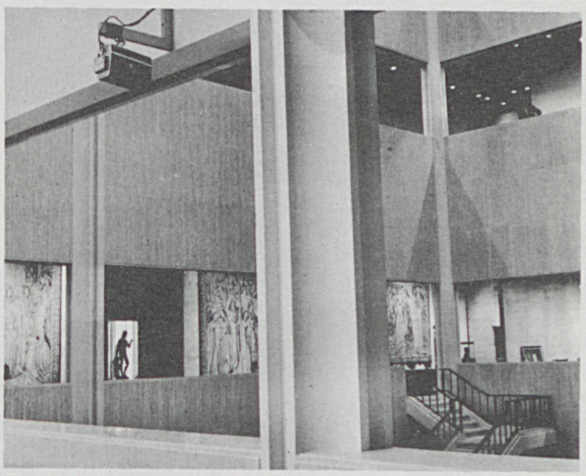
Motion detection

Like an audio system, a motion-detection system uses sound to detect intruders, but the two work on entirely different principles. An audio system detects intruders by the noise they make; a motion-detection system spots intruders because their movements make changes in soundwave frequencies.

A motion-detection system has three elements—a transceiver filling an area with sound waves and picking up the standing-wave pattern; a power source with adjustments for sensitivity, phase and oscillation; and an alarm back at the central console. (Some systems have separate transmitters and receivers.) So long as there is no motion in the area to distort the sound-wave pattern, the frequency picked up by the transceiver is the same as that sent out. But any movement disturbs this pattern, turning on an alarm.

Available systems differ in the sound frequency used. "Man-sized" sound waves are less likely to be triggered by false signals (as heat from a radiator moving a curtain).

Sensitivity can be adjusted so the detector will pick up any motion, no matter how slight. Too fine an adjustment, however, makes the system overly susceptible to false alarms. To guard against this danger, at least one system can be equipped with a counter which triggers an alarm only after a preset number of impulses within a certain time period. This means that one disturbance from a falling object or a window shade suddenly winding up, for example, would not turn in a false alarm.



Television cameras begin their security work even as the Los Angeles County Museum of Art begins moving into its new quarters. All photographs courtesy Honeywell, Inc.

Cost of a motion-detection system is surprisingly low: An entire area can be protected for about $800.

Vibration detector

An electronic vibration detector reacts only to vibrations caused by someone moving or even touching a protected object. About the size of a pocket watch, the detector can be taped, glued or otherwise fastened to a painting, statue, cabinet, wall, door, safe—any object at all. The moment the detector is jarred, it flashes an alarm.

Because the detector is immune to sound, it can keep watch over noisy areas without turning in false alarms. This makes it especially useful in museums where it can stand guard during visiting hours as well as after hours.

Sensitivity can be easily adjusted so the detector won't react to machinery vibrations or nearby footfalls—or even people touching a painting. But

if they move it, the detector alerts a guard. The units are rugged; they can be dropped without affecting their performance.

Cost of a vibration detector is surprisingly low: A complete system with four detectors, a monitor and alarm annunciator sells for around $400.

A portable detection unit—also uses vibration detectors (or audio-detection microphones) to guard an entire area. About the size of a small suitcase, the sentry can be carried anywhere and put to work by simply plugging into a 110-volt line. It can be hooked up to remote alarms at the guard station; it also has two integral alarm systems that start ringing at the first hint of trouble.

The unit includes a built in pulse discriminator that can be set to ignore a given number of alarming noises—as from a truck backfire or thunderstorm—within a preset period before turning on the alarm.

By adding up to 10 remote vibration detectors or microphones, a single suitcase sentry can cover a number of galleries or even an entire museum. By moving the sentry every night it can protect different areas.

Cost of suitcase sentry system is around $300; remote detectors, microphones and alarms are optional.

Photoelectric

A photoelectric system is basically the same setup that opens automatic doors. Elements of a photoelectric system are a light source giving off visible or invisible light, a light-sensitive cell and an alarm at the guard console. Light from the source is beamed to the cell, which converts it into electrical energy. Interrupting the beam sets off an alarm.

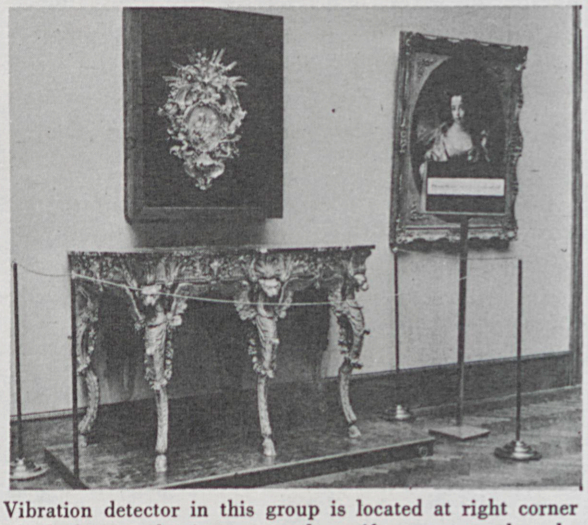
Visible light is almost worthless in a security installation, for clever thieves would spot it at once. An "invisible" beam of infrared or ultraviolet light is almost as bad, because the light gives off a faint glow which an experienced intruder, looking through special filters, can see immediately.

However, many of these drawbacks can be overcome by using a flashing beam flickering in a predetermined sequence. Usually this is a spinning disc at the light source, though a better method is to interrupt the beam electronically. Because the receiver is tuned to the same interruption frequency, an intruder cannot simply substitute another light source.

A photoelectric system has other drawbacks. Since light travels in a straight line, mirrors are used to reflect the light around a gallery or cover a specific art object. The system can be defeated if the mirrors are knocked out of alignment or get

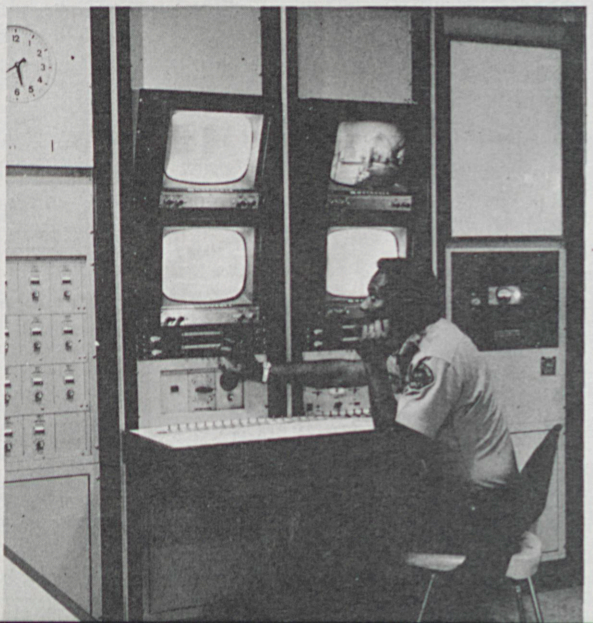


An inconspicuous vibration detector can be attached to any type of object, then sound an alarm if the object is moved. Painting or object may be touched, but any attempt to move or damage it immediately summons a museum guard



Vibration detector in this group is located at right corner of platform and triggers an alarm if anyone touches the Venetian table. Built by Piranesi in the 18th Century, the table has been called America's most glamorous piece of European furniture in a United States museum

A console monitors electronic eyes and ears scattered throughout the Los Angeles Art Museum. Each monitor has six channels. Guard can see twenty-four locations throughout the Museum without leaving his office chair



dirty. This characteristic can become an advantage for the intruder: He simply adjusts a mirror so it reflects the light directly to the photocell, then moves into the unprotected area with impunity.

Photoelectric devices are available from Ademco, Kidde (ADT), Honeywell and others. Because a photoelectric system is set off by interrupting a light beam, Honeywell uses this principle in its Smoke Detector. Even a wisp of smoke is enough to set off this fire alarm, long before a fire has a chance to make headway. Smoke Detectors can protect galleries, corridors, stairwells.

Light is used on another photoelectric detector resembling a camera light meter. This detector measures available light in a gallery or corridor. Any change in this light sounds an alarm. For example, the detector could be set for darkness. Then any light—from a match or flashlight—that faintly lit even a portion of the room would be detected by the device. Conversely, in a partially illuminated room a person or his shadow would reduce the available light, triggering an alarm.

Electromechanical

Of all the security devices, an electromechanical is the simplest, cheapest, easiest to install—and easiest to discover. An electromechanical system is simply a continuous circuit around walls, skylights, doors, windows. Shorting or opening the circuit sets off the alarm.

Because it is so easily spotted and jumpered, an electromechanical system is often overlooked in an appraisal of security devices. But this very drawback can be turned into an advantage. By protecting an area with electromechanical devices backed up by another security system, the electromechanical devices can be used as a foil. When an intruder has bypassed these, he believes the way is clear, then blunders into another system he hadn't counted on.

At doors, windows and other closable openings, snap-action switches (from Ademco, Fruh, ADT, Imperial, Micro Switch) can be used. These permit the door or window to be opened during working hours and secured after hours. Any movement of the door or window after it's been secured turns on the alarm.

Wires, strips or screen can be laced across permanently closed windows or skylights. Tape and foil can surround specific areas. Pressure-sensitive mats (Partrick & Wilkins) can be put in galleries, under rugs, in front of paintings and statues. These are simple devices not overly susceptible to false alarms, so any warning is usually genuine.

Costs are hard to generalize, but figuring $100 a door or window in the average museum would also buy a central alarm console.

Electronic fence

Basically an electronic "fence"—somewhat a misnomer—is a current-carrying wire radiating an electrostatic field. Anyone coming near the wire disturbs this field and triggers the alarm. Fences are offered by Kidde, Powers (Mosler), ADT (Teleapproach) and Honeywell.

The Honeywell electronic fence consists of a capacity-change detector (with two nearly identical oscillators kept synchronized), an amplifier relay, signal generator and power supply. The antenna wire is the fence itself. An intruder sidling up to the wire detunes one oscillator and thereby changes the coupling circuit, sounding an alarm.

The fence can be run around an entire floor, an individual gallery or an object in the gallery. It can protect both metallic and nonmetallic objects. It can be installed at floor level or around the edge of a case or picture frame. Connecting the fence to a metal object—like a stand or case—makes the object itself an extension of the fence. A capacitance switch—made by Ademco, Honeywell and Kidde—works much the same way.

Cost of an electronic fence varies with the installation; generally it is competitive with other security systems. An extremely rough estimate would be $500 for an entire gallery or a series of objects—paintings, statues, display cabinets.

Radio-frequency

Like a motion-detection system, a radio-frequency security system fills an area with invisible waves. But while the motion-detection system uses sound waves, a radio-frequency system uses electromagnetic waves. A transmitter pours out a radial pattern (up to 25-foot radius) of high-frequency waves which are picked up by a receiver. Any disturbance or interference with the pattern turns on an alarm.

The waves are extremely penetrating, passing right through most materials. This characteristic is both an asset and a liability. On the one hand, the waves permeate an entire room so an intruder cannot hide from them. On the other hand radio waves pass right through walls, meaning the walls may have to be shielded: This can be costly and troublesome.

A radio-frequency system is small, easy to set up and surprisingly inexpensive. But while a system can be installed for less than $500, the necessary shielding can quadruple this cost.

Closed-circuit television

Just as an audio-detection system extends the ears of a guard, so closed-circuit television extends his eyes. The camera looks out on an area and transmits what it sees through coaxial cable to TV monitors. Closed-circuit systems are available

from Motorola, Dage, Philco, GE, IT & T, Blonder-Tongue, Ling, Sylvania, DuMont and others.

While closed-circuit television is costly—from $500 to $1500 for a camera, around $300 for a monitor, plus cables and controls—it can save sizable sums. For example, a television camera can stand guard over an entire gallery, saving a guard patrolling that area.

But while television can see, it cannot signal if an intruder looms on the screen. And staring at an image of an empty gallery for more than five minutes can be extremely boring. But another security system guarding the gallery could tell the guard when to look. An electronic fence, for example, could signal if someone came into the gallery. At the signal, the guard would turn to the television screen to see what was happening. Separate channels could cover each area of the museum.

Originally a television setup was somewhat limited by changing light conditions, but automatic lens-opening devices have virtually obviated this drawback. Other devices pan and tilt cameras by remote control so they can sweep an entire gallery.

Door and gate control

While any museum door opened after hours should have a guard right there, a complete run-down of security systems should include remote-door control. Such a system provides positive control of a remote door (or gate) plus two-way communication between the door and the control console. A person wanting to get in (or out) presses a button, alerting the guard at the control console. The guard checks the person over the intercom and, when satisfied, releases an electric lock to open the door.

When the door has closed again, a magnetic switch operates an indicator light on the panel. The panel can also have a gage to show position of the door from fully open to completely closed. If the door is opened by an intruder, an alarm automatically goes on. Such an alarm system should be used at all entrances, even those "always" locked at night.

A number of such sophisticated security systems help protect Los Angeles County's striking new Gallery of Art. In all, dozens of electronic watchdogs are linked to a command post so, in effect, one man can guard the entire Museum complex.

Long-range electronic "eyes" and "ears" plus electronic "sentries" at various doors feed information back to the master console. Thus one guard can watch over the entire Museum complex—the four-story main gallery, the two-story exhibition hall and the auditorium—and dispatch patrols at the first hint of trouble.

Moreover, the master console has plenty of growing capacity. The Museum is already planning to add two more buildings—making five in all—and security systems to guard these new buildings will also tie into the console.

The electronic eyes—closed-circuit television cameras—keep watch over every corner of the gallery. These work in tandem with electronic ears—audio detectors—that listen in on the buildings after hours. If these ears hear anything suspicious they immediately flash an alarm, telling the guard which television channel to look at. And the door sentries "blow the whistle" if anyone opens a protected door.

In contrast to roving guards, these electronic watchdogs are always alert, always on duty, react instantly to the first hint of trouble. Moreover, if someone figuratively clouts an audio system over the head—by cutting or crossing wires or ripping out a sensitive dector unit—the system doesn't quietly lapse into unconsciousness but starts screaming for help.

Mounted in the ceiling, the audio detectors trigger an alarm if noise goes above a certain threshold level. (Even late at night there will be *some* noise in the Museum from the air-conditioning system, traffic on Wilshire Boulevard, aircraft and the like.)

The Honeywell audio-detection system also includes the pulse-discriminator which helps eliminate false alarms by reacting only if it hears a certain number of sounds within a preset period.

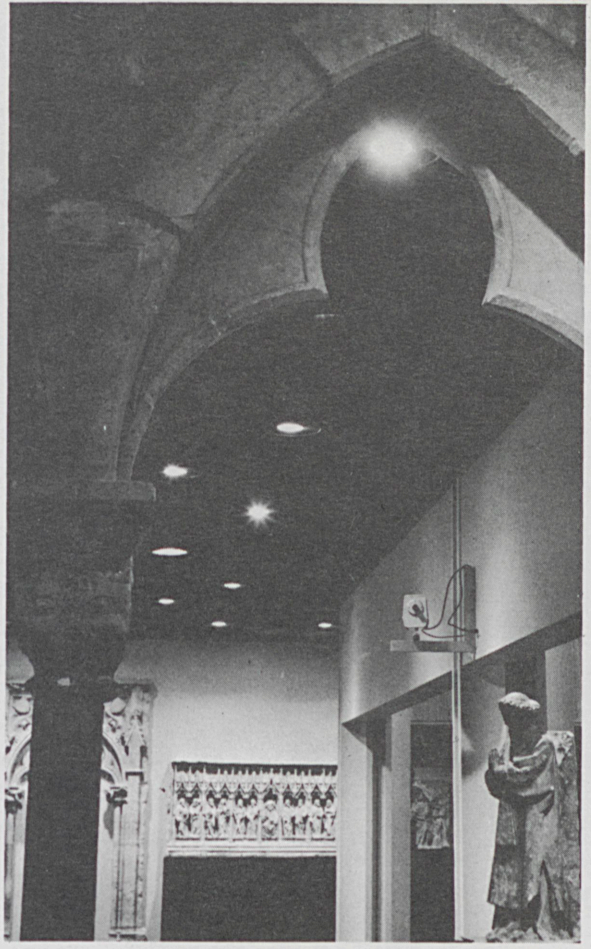
The door sentries—turned on after hours—relay an alarm if anyone opens a protected door. (Because of fire regulations, certain exits must always be openable from the inside.)

All three systems—television cameras, audio detectors, door switches—feed information back to the main guard console. Here, simply by touching pushbuttons, turning knobs or flicking switches, a guard can look or listen in on any Museum area, post an electronic sentry at any door, or talk with anyone in the protected areas of the Museum.

Right in front of him the guard has four wide-screen television monitors. About the size of portable TVs, each has six pushbutton channel-selectors. Touching a button switches the monitor to a different channel, picking up the view from a different remote camera.

On a desk-like platform beneath the monitors are a series of toggle switches plus a row of colored Micro Switch lighted indicators. These switches watch over twenty-seven exit doors, flashing an alarm if one is opened after hours. The lighted indicators are color-coded to show door location—red for the main gallery, blue for the two-story building, green for the auditorium.

The panel also includes a remote-control system to operate the garage door. From the console the guard simply touches a button to automatically



Television stands guard over medieval art in this gallery. Wide-angle lens enable camera to cover significant areas

open or close the huge door. A television camera watches over the area so the guard can see who's coming in—or going out.

The audio detectors are controlled individually by lighted pushbuttons on the Data Center panel. Since each is turned on separately, night employees can work in protected areas without triggering alarms. In an alarm situation the lighted pushbutton changes color to indicate the trouble areas and a horn starts blaring.

At the master console the guard can also adjust sensitivity of any detector by simply turning a knob. In effect, the "ears" can be throttled back to prevent false alarms from temporary situations—road work on Wilshire, for example.

The panel also includes an intercom station selector so the guard can tune in which gallery area he wants to talk to—or listen to—if he gets an alarm indicating suspicious noises.

All in all, this gives the Los Angeles Museum one of the best protection systems in the country, according to George Carey, project architect for William L. Pereira & Associates, architects for the Museum.

While not every museum can afford—or even needs—a security setup as elaborate as that in Los Angeles, still virtually every museum needs better protection that it now has. Faced with constantly spiraling costs, museum directors don't have constantly spiraling budgets. Yet in terms of protecting priceless paintings and other art objects, electronic security systems are well within the most modest museum budget (as, for example, self-contained portable detection devices for around $300).

Now a few cautions:

Whatever security system is finally selected, it will be connected to the central console by wires. At one time wires were the most vulnerable part of the entire installation; in some cases they still are. It does little good to have a security system standing guard when a clever intruder can simply snip the wires or cross them with a jumper, then ransack a gallery with no one the wiser.

This danger can be eliminated with line-supervision devices which detect a current variation small as 5 per cent. Built into good security systems, such a device immediately turns on an alarm if anyone tampers with the wires anywhere in the system.

The security system should automatically warn if a component fails. For example, if a tube in a television set goes bad, the control console should immediately tell the guard so repairs can be made.

Security is not a do-it-yourself project for the museum mechanical engineer to fool with during his spare time. For best results experienced people should be called in. Make certain the company manufacturing and installing the equipment is reliable and service is available. Be sure the entire installation is automatically supervised to stand guard against electrical failure and tampering.

And while price is important, it is not all-important. Often spending a hundred dollars more for a better security system can save hundreds of thousands later on.

When building a new museum (or adding on a wing) don't ever show security equipment wiring on building plans and electrical diagrams. These plans pass through hundreds of hands, and one pair might want to save the information for use later on.

A parallel is not to install security equipment during construction. Wiring and equipment should wait until the building is finished. Take a tip from a bank: few people know precisely what and where the security system is, but everyone knows it's there.

When the installation is finished give it a rigorous test. Knowing how the equipment works and what it should protect, try to outfox it. Cut the power to the system, cross the signal wires, try to put it out of business. If the system quietly curls up and goes to sleep on you, it will do the same for an intruder. What you want is a system that will wake up screaming.

Because if it doesn't, the Trustees will. ✣



. . . Stepping Up Security



by Joseph M. Chapman

During the past decade we have witnessed an unprecedented interest in art. Daily increases in museum attendance, as well as extended cultural activities and facilities, have demanded, and enabled, our museums to expand their services and to enlarge their operations. With these expansions and increases have come the need for larger and more professional staffs. Virtually every aspect of museum operation has become more specialized and more exacting and therefore more productive and more rewarding. Advances in the fields of education, display and transportation techniques, lighting and environmental control, conservation and cataloguing have largely met these needs. Professional personnel and trained staffs have enabled our museums to keep pace with the increased activity and expanded facilities.

Museum security has not kept pace and is the most neglected aspect of museum administration today. Most institutions have suffered because security has not received the professional attention afforded to other aspects of operation.

Security programs in a number of museums were conceived when collections and facilities were smaller and attendance much less. The mere assignment of additional guards to an expanded museum or to one with increased facilities has not provided the adequate security required. Recently established museums have been opened to throngs overwhelming the security force. The inadequacy of museum security has created a potential for undesirable incidents often having disasterous results. I do not know of any institution that has not suffered fire, theft, vandalism or the threatening presence of unruly visitors. Regretfully an awareness of the need for proper and adequate security usually comes only after the museum has been the victim of disaster. With this awareness comes the realization that security in a museum is a particular and oftentimes peculiar responsibility. I have studied the security procedures in a number of museums and am familiar with most of the unfortunate incidents that have occurred. Every such incident could have been prevented had adequate security existed. Security in a museum is essential to every other element of administration.

It is a peculiar responsibility since it can not be achieved through the same procedures available to banks, industrial sites and other locations housing valuable property. Electric fences, barred windows and elaborately locked vaults serve the desired purpose for those institutions. Such institutions can strictly control the movement of visitors and impose severe restrictions on staff and visitors alike. Such procedures are in conflict with the aims and purposes of an institution dedicated to the advancement

A security check-list as well as some plain talk about reasons for museum security is presented in this paper which was originally given at the 1965 Annual Meeting. Mr. Chapman is a former FBI agent who now serves as security consultant to museums, collectors, and insurance firms

of culture and the display of man's creations. The incidents of theft and vandalism have recently prompted a suggestion that the visiting public be confined to glass-walled corridor in each gallery to prevent visitors from coming too close to the works of art displayed. Museums can not adapt either this plan or one that requires locking works of art in a vault each night. Created for the purpose of displaying the valuable property in their trust, museums exist in an environment unlike any place of business, educational institution or other public establishment. While these dissimilarities exist, museums are still subject to the same incidents that take place in other gathering places.

Susceptible to fire, which in other institutions can be far less damaging, museums have been the scene of picketing, rioting, and brawling visitors, as well as other activities usually confined to dance halls and sport stadiums. Slashed and defaced paintings have become all too common. Marbles and bronzes often bear the scratched or lipsticked initials of visitors, or the visitor's opinion of the work. Recently a fleeing holdup man took refuge in a museum during public hours and while attempting to mingle with the large crowd of visitors disposed of his weapon, a sawed-off shotgun, in a displayed item. A museum lobby was the scene of an attempted reconciliation between a man and his wife. The distraught husband shot and killed his wife before the eyes of the Sunday afternoon visitors. Museums in every community are more and more the gathering places of the public. The vandal and the thief have also come. We were all pleased by the recent recovery of the London National Gallery's Goya portrait. Many stolen art items are recovered, yet the unrecovered would constitute an impressive collection. These incidents and the increasing number of thefts are unpleasant evidence of museum security's inadequacy.

Since our museums have become the cultural centers of our communities and are now providing more activities, such as lectures, concerts, films, the general public has become more interested in what is happening in "their" museum. Inadequate security creates the potential for incidents that are reported in the press, often in a manner embarrassing to the museum. Newspaper reporters have a ready audience among those interested in scandal as well as art. The serious intent of the director and his staff suffers when the once-admiring public becomes aware of the small or large weaknesses in the operation of the museum. Every museum is in the public eye. These adverse reflections have other undesirable results. Reports of vandalism have often led other "daring" visitors to attempt the same act or to see if they can accomplish something more profound or amusing. A college fraternity hazing recently demanded one student steal a marble bust to prove his mettle. Though soon recovered the bust was damaged in the hands of the pranksters. The reputation of a museum suffers when newspapers report the ease with which a security system is by-passed. Potential donors and lenders, including other institutions, are reluctant to entrust their possessions to a museum with a reputation for inadequate security. The absence of proper security has an adverse effect on trustees, insurance underwriters, foundations, and others who play a part in the financial operation of the museum. Your security procedures are often one of the means by which many people gauge your operation. The confidence of staff and the supporting public can not be achieved until all are convinced that every element of your operation is efficient and adequate. Security in a museum is a major element and is best considered as permeating all other aspects of administration and activity. The tasks of assembling and displaying a collection carry the responsibility of preserving the collection for those generations of visitors and scholars to come. Adequate security will enable a museum to discharge this responsibility with satisfaction.

It is not possible to advance any single security program applicable to all museums. Many factors make every museum different from all others and these factors require security programs designed according to these factors. Among these factors are the physical construction of the building, its location in relation to other buildings and public facilities, its setting, the availability of emergency assistance. Each museum's chartered purposes, services and functions, local laws and ordinances as well as public hours and means of admission must be considered. These are among the factors that dictate the security system required to satisfy the needs of the individual institution. A panacea does not exist that can be applied to all museums. The museum must be surveyed to evaluate its security needs and an individual system designed to achieve adequate security. Certain general recommendations can be made that will apply to all museums:

1. Every museum should have one officer or executive responsible for security. Its direction and control can not be left to the responsibility of the general staff. This lack of fixed responsibility was found to have contributed to the potential for damage, fire and theft in London's National Gallery. Realization came only after the theft of the Goya. This officer should be familiar with local laws covering public assembly, arrest, eviction of the unruly and emergency procedures. The professional standards demanded in other departments must apply.

2. Museum activities, and this includes shipping, receiving, reconstruction and expansion, exhibition and activities should be considered and planned with the intention of maintaining security at all times in all activities. It can not be disregarded for any period without inviting incidents and creating a potential for danger.

3. A guard force, whether armed or not, must be trained to carry out the responsibility entrusted to them. A guard should not be retained, despite the pressing need, until his background has been investigated. A guard at one Canadian museum was avenging himself for lack of promotion when he stole and burned a Renoir. A guard at a university in New York was bored with his night shift assignment and set fire to the rare book library to create satisfying excitement and activity. A man with undesirable habits and traits should not be entrusted with the welfare of the visiting public and staff and is less than adequate as a safeguard of invaluable and irreplaceable property. After the Director and his curators assemble a collection and the trustees and publicists invite the public, the entire facility is placed in the hands of the security force. With the staff behind the scenes, the guards are often the only museum employees with whom the visitor comes in contact. Guards must be trained. Their responsibility exists to the institution, to the collection and to the visiting public. It also extends into the dead of night. They must be trained as representatives of the museum. They should be trained in handling the public, singularly and in large numbers. Increased attendance has created problems in visitor flow and any congestion is a danger. Guards must know what questions they can answer and what information they can not divulge. Not only must emergency equipment exist for the security force but all members must be trained in the use of extinguishers, and first aid equipment, as well as communications. The guards' morale and sense of responsibility must be maintained at a high level. Remember what has been entrusted to them. Specific plans must exist to be placed into operation when some incident occurs. Every type of incident must be anticipated and the guards trained to handle them. Reliance on an untrained guard's common sense in dealing with an emergency has often led to disaster with severe criticism of the results. Until a guard is trained he is an amateur.

4. The advantages and limitations of electronic and mechanical alarms and safeguards must be completely evaluated in light of the many factors governing the purpose and operation of the museum. All such alarms and safeguards must be considered as aids to a guard force and these can not replace the trained patrolling guard. Among the aids essential to the guard force is a communications system designed to summon assistance from within the museum and from without. A sole night-line may be engaged and prevent a guard from reporting fire or theft. Many devices exist that can aid in providing security. Low capacitor wiring around the building or atop walls will detect an approaching intruder. Ultrasonic devices will detect movement in closed galleries and storage rooms. Alarms can be placed on doors, windows and ducts. Pictures, show cases and sculpture pedestals can be alarmed. Electric eye systems can be used. All alarm systems can be designed to sound locally during public hours or at a central location after closing. Closed circuit TV has advantages; so does the use of patrolling dogs. As an element of your security systems, all alarms and devices should be considered only if your needs require and your functions permit. The systems and devices of other institutions may not have value at your site.

5. General recommendations include the periodic inspection of exhibited items. The rolled-up six feet of a Shegtsu scroll were not found to have been missing from the display case until the exhibition was being changed. Pages from a Cezanne sketchbook, pages beneath the open page, had been missing for nine years before the loss was discovered.

6. Specific procedures must be established for the opening and closing of a museum. It must be determined that no unauthorized person has remained behind at closing. The visitor bent on theft or destruction after the public has left has only to escape when his act is completed. He can usually count on certain doors being opened from within to satisfy fire evacuation regulations. An intruder whose presence is undetected during the night may have carried off an object that will not be missed until midday unless an opening inspection is made. Stored items should also be inspected periodically to assure their presence and condition.

7. A good pass system for visitors to museum offices and for incoming or outgoing packages should exist. It should be designed to prevent a person authorized to visit one area from having a license to wander at will. Every outgoing package should be inspected and the pass should reflect the authorized contents.

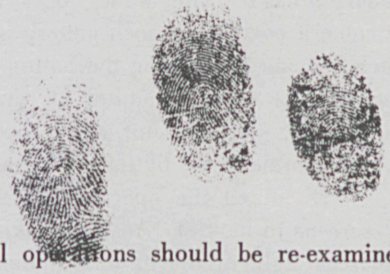
8. A well-controlled key system should exist and the keys for one department should not operate

the locks of another. All keys should be issued by one source and should be recorded. In a museum where such a system does not exist a theft from storage makes all employees, and often long-detached former employees, suspect.

9. The system employed by the registrar should reflect all property in the museum and its location. Without elaborating on this point I will illustrate its value by mentioning the part-time museum employee who found that the limited-access keys issued to him opened storage rooms. He engaged in a series of thefts which went undetected for some time because he also removed the item cards from the registrar's office. Only when an inventory was conducted using the master cards which had been secretly kept in a safe were the thefts discovered.

10. Guards should record unusual incidents, apparent "false" alarms and the visiting of suspicious persons. Such information has proved invaluable when theft or damage occurs.

11. The advantages of screwing pictures to a wall are often presented by those concerned with security but the difficulty of rapidly removing the items in the event of water leak or fire does present disadvantages. Methods of hanging and displaying should be devised, and adhered to, so that small items can not be just lifted from the picture hook. Display cases should be constructed so that the method of opening or disassembly is not apparent to the visitor. Small sculpture and construction items as well as jewelry, books, models and manuscripts must be adequately secured to pedestals or confined to secure cases.



12. All operations should be re-examined from the point of view of security to determine whether potentials exist for loss, fire or theft. Visitor traffic patterns may require occasional revision in order that congestion be avoided. The location of entrances and exits, requirements for checking property and the juxtaposition of works of art that may cause strong emotional feelings all have a bearing on the degree of security that can be achieved.

13. Fire drills and emergency evacuation procedures are essential to every museum. They should be detailed and all staff should be familiar with such procedures. Procedures for cleaning office and gallery area should be studied and evaluated. The smoldering tissue in a cigarette receptacle may cause as much panic and alarm as a large blaze. Carelessness must be guarded against.

The most popularly known effects of poor museum security lie in the incidents of theft and vandalism. A study of museum thefts and incidents of vandalism show that these occur most frequently in the latter part of the afternoon. Most thefts are carried out either then or by a visitor who stays behind after closing. The third greatest incidence of theft takes place between the hours of 11 p.m. and 4 a.m., and are committed by the burglar who breaks in, steals and then departs. The professional crew of thieves who took the Star of India from the Museum of Natural History had used hidden cameras and two-way radios to plan their entry and escape. Unknown to most is that they had similar plans, in minute details, with floor plans and rooftop photos, for thefts from two other museums. The amateur thief whose actions are more unpredictable may constitute an even greater threat.

A museum is most vulnerable during periods of renovation when ropes, ladders and other tools are about. A number of thieves have been inadvertently aided by the disruption of normal activities, the absence of certain previously required facilities and the lack of preparedness of the staff.

Today's museums are big business and every element of operation deserves professional attention. In its proper perspective the element of security must conform to the high level required of all other aspects of the museum field.

Your security program should be designed to your needs. It should exist to prevent incidents. It cannot assume control of your operations but must be all-inclusive and yet expandable. It must fit your specific needs. Anticipate and plan.

Loss and damage can be prevented with adequate planning and adequate expenditures of time and money. It is inexcusable not to keep loss and damage at a minium no matter how harried you are. The first step is to be aware of the need for security, the next step is a survey of your special weaknesses and plans to make them less vulnerable if they cannot be eliminated. Security cannot be limited to one phase of museum operation. It only functions well when you have a master plan for all possible contingencies. And like all other forms of competence, this is only achieved by careful forethought and constant supervision. I sincerely urge that you devote your attention to your security. If you do not, neither your collections, nor your exhibition plans, nor your scholarship, teaching programs, nor your research can hope to survive the burden of contemporary social environment. I believe we are face to face with a serious responsibility. ✣

TELEVISION–

by Albert J. Grossman

How television is used at The Cleveland Museum of Art—not for public relations, but for security—is discussed in this paper that was first presented before the Superintendents Section at the Annual Meeting in Philadelphia. Mr. Grossman is Operations Administrator at the TV equipped Cleveland Museum of Art

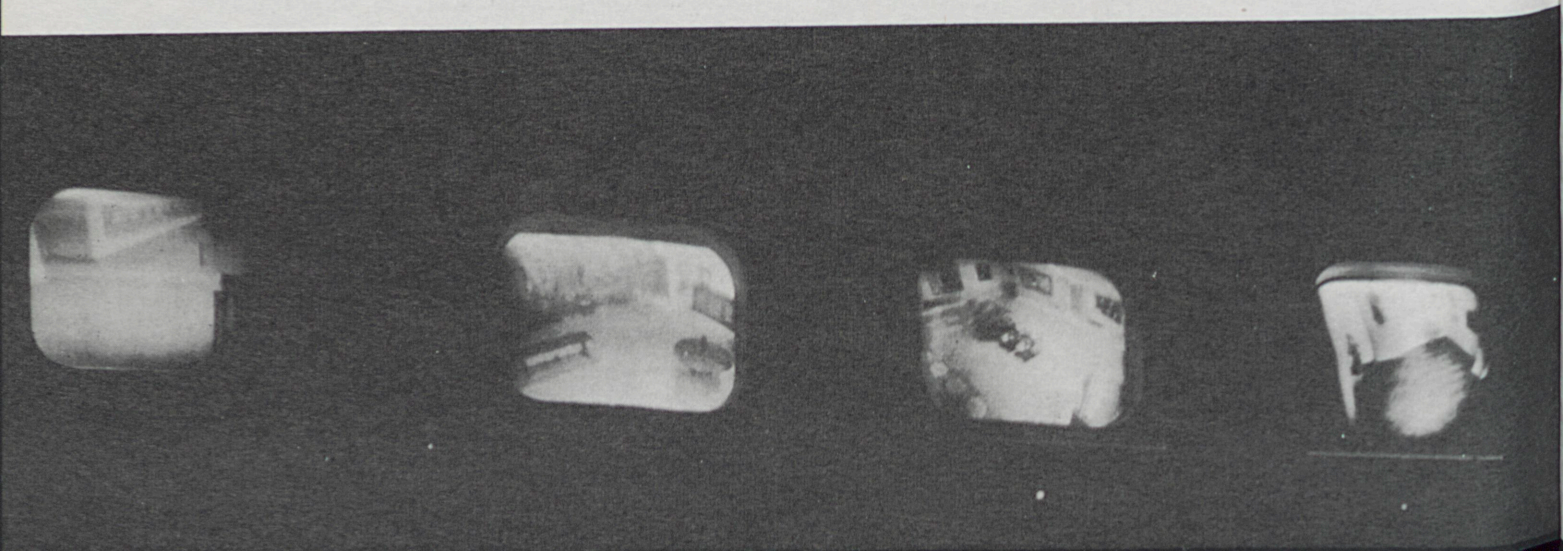
Almost ten years ago, the Trustees of The Cleveland Museum of Art were confronted with two very serious problems: first, how would the Museum with the proposed addition of the new wing be properly protected; and second, how much would the budget stand in view of the additional galleries to be serviced?

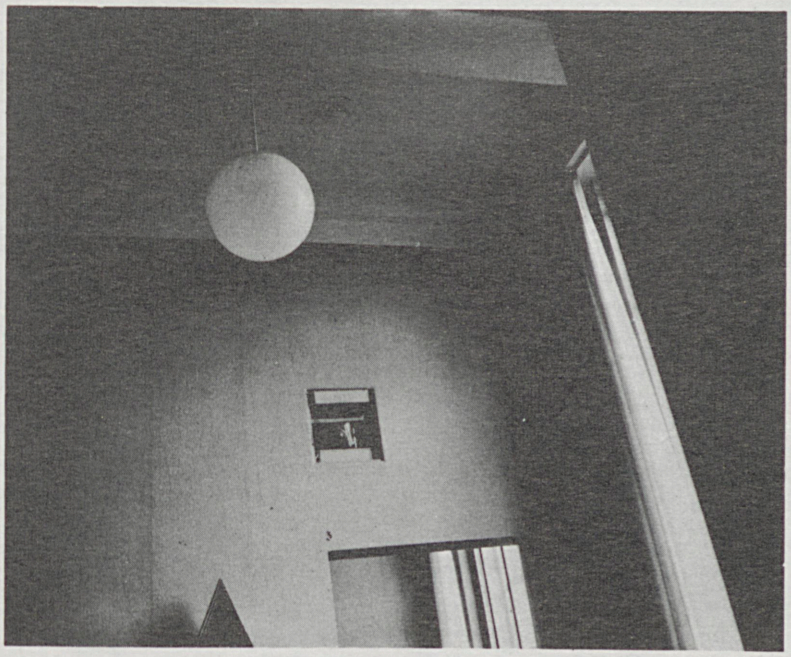
At that time a rather elaborate supervisory system was being planned. After a thorough study of the problem, it was decided to install closed circuit television. Here was a new product of the scientific and industrial age ready to supplement the Museum's regular guard force. The Cleveland Museum of Art thus became the first museum in the world to install this type of equipment.

The installation covers some thirty-nine galleries. This takes into account the new wing, as well as the old building. There are twenty-one rotating and twelve stationary cameras. The rotating cameras oscillate from side to side, giving wide coverage of awkward areas. These cameras have a remote control switch which, when depressed, will stop the oscillating motors for stationary viewing. The stationary cameras have a wide angle of vision, from 45 to 50 degrees, and are located in areas best suited for this purpose. By installing a camera between the walls, two galleries can be covered by a single camera, while some other galleries have two cameras. The pictures received by these cameras are then transmitted to the Museum's master control center, located in the new wing, where the pictures appear on eight television screens. By following a systematic switch sequence, a control room operator can patrol a group of galleries and thereby aid the physical presence of the guard in the area.

The camera system is supplemented by a network of microphones which gives our security ears, so to speak, as well as eyes. As you would assume, our eyes are most useful during the daylight hours; our ears are invaluable at night. And there is a voice, as well, in the form of a loud speaker system coupled with the camera-microphone arrangement. The control room operator can immediately contact any one of several guard stations should he note any trouble developing in the galleries. Thus, in extraordinary circumstances, he can see, listen to, and address persons in the Museum's galleries. Such measures have almost never been necessary, however, since the cameras seem to have a marked prohibiting, psychological effect. We have had to make use of our speakers near the cameras on a few occasions when children began touching some of the works of art. On one specific occasion the Captain of the Guards was notified of an attempted theft only to discover that the so-called attempt was made by a lender who had removed one of his paintings from one side of a partition to the other side. It was realized (after calling the Captain of the Guards) that the owner of this painting was with one of our curators who was making an installation change and was not visible at the time. In our opinion, the cameras, speakers and receivers had definitely proven their worth.

The control room operator sits behind a desk-type cabinet with the top of the cabinet at an angle for easy viewing. On this desk is a floor plan drawing of the gallery areas showing walls, doors, windows, etc. The camera position in each gallery is marked by a switch button. Depressing the button connects that camera to the correct monitor or screen, partially connects the sound circuit, starts the panning motors, and illuminates the button with one of eight numbers, so as to tell the operator which of the eight TV screens to look at. Anyone looking at the floor plan sees eight of the buttons lighted with a different number. He then knows, for example,





Television camera set in wall between two galleries keeps an electronic watch on both, as the images it picks up are relayed to monitors (photograph below)

Museum Watchdog

that the TV viewer or screen marked number "one" is exhibiting the picture from the gallery with the illuminated number one button.

This system is exceptionally useful on weekdays when the number of visitors to the Museum is smaller than on crowded weekends. It is especially valuable in guarding the Museum at night when the speaker systems can be turned up to a very high degree of sensitivity to detect unusual noises in the gallery areas. The control room operator knows the route and time for each watchman as he goes through the galleries and can immediately hear any sounds from the galleries not patrolled at that time.

Another use of our television, although incidental to its prime function, has been the effective control of traffic in the galleries. This is particularly true at the opening of a special exhibition. One can stay in the control room and notify the guards when to stop the admission of visitors if the galleries get over-crowded. The guards can then re-route them in another direction or simply wait until the congestion has cleared before allowing more visitors into the galleries.

Let me make one point clear, however: television is not a cure-all. There is no substitute for an intelligent and well-trained guard. However, when the cost of maintaining large numbers of guards becomes a problem, television can be the tool that makes "ends meet." It should be regarded as a tool and therefore only as effective as those who use it.

Now that I have given you some idea of the operation of this system, let me give you some cost figures. I am going to present this in two parts: part one, showing the initial cost of the system, and part two, the potential savings by its use, or the mechanical force versus the human force.

The initial cost of the equipment was $63,000. Wiring and installation for same came to $30,000. Vidicon tube savers were purchased at a cost of $8,000. There is a service contract which covers all parts and labor, except the vidicon tubes, at an



annual cost of $5,000, or $35,000 since date of installation. In addition, the average replacement cost of six vidicon tubes per year comes to $8,000. If we then add these figures we get a grand total to date (that is from April 1958 to April 1965) of about $144,000. One would then ask, how does this cost compare with the number of guards that would be needed in the event that this system was not in operation? You will be able to judge for yourself from the following statistics, keeping in mind that we are using twenty-nine guards (this includes four control room operators needed for the TV application) instead of the thirty-six guards normally required. In 1958 the cost of the services of one guard amounted to $3,700. This included his salary and all fringe benefits. In 1959 the cost was $3,900, and in 1960, with the addition of free term insurance, another fringe benefit, the cost rose to $4,100. In each succeeding year the cost has gone up, so that in 1964 the cost of this same guard's services has risen to $4,800.00. Now then, if we multiply the annual cost of one guard by seven, which represents the number of guards that TV has supplemented for each year, by seven years, we would have had a total expenditure of $207,000. One can readily see from these figures that during the seven years of the TV application the museum has been able to save almost $65,000. It clearly indicated that the TV cameras have more than paid for themselves.

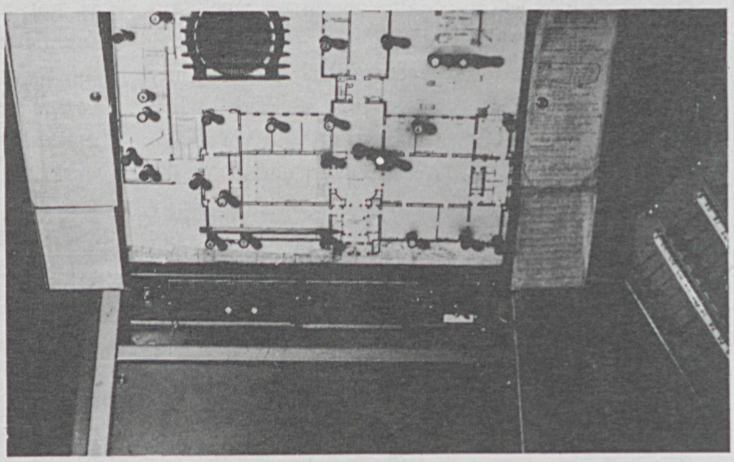
A specific outgrowth of the use of TV at the Museum has been the installation of twelve units at the new computer center of The Cleveland Trust Company, Ohio's largest bank. This installation not only covers the garage entrance, where all the coins and securities are brought in, but also their coin counting rooms, security cages, as well as their new vaults. Upon personally viewing this installation recently, I had the opportunity to discuss the operation with the Vice President in charge, who immediately stated he was so well pleased with the results to date that he was in the process of having more cameras installed in other areas of the bank.

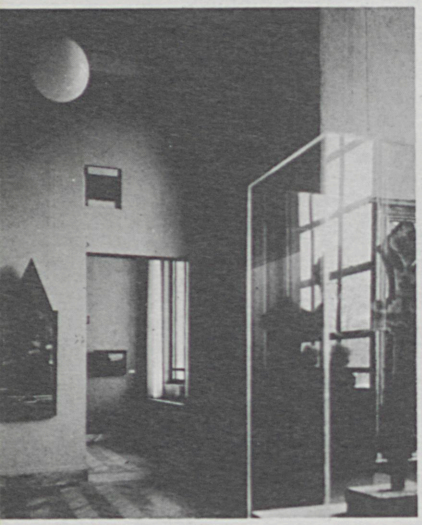
Television is being used more and more for surveillance purposes, whether it be for supplies, finished products, inventories, money, or art. Initially it does seem to be a large outlay of capital and most individuals like to see results before they invest in such a venture, but these results speak for themselves.

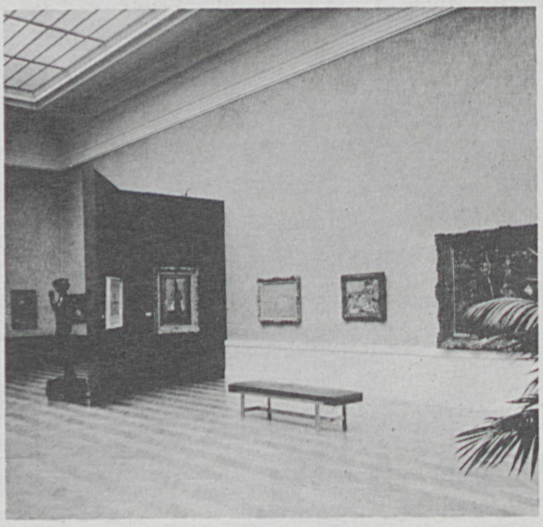
I should, finally, repeat that this system supplements or complements our present guard force. It does not in any sense replace it. ✣

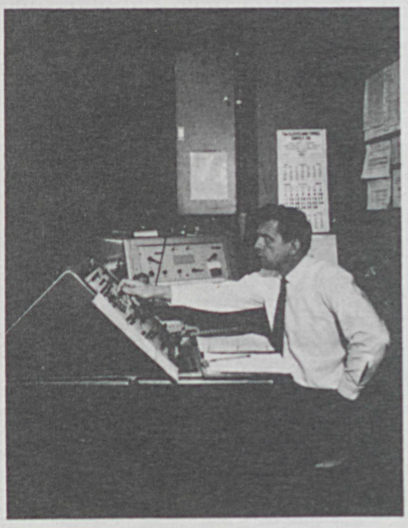
Upper left: The television camera hides away in a ceiling corner. Upper right: A portion of the console showing camera locations. Lower left: The same camera shown on page twenty-three. Lower center: The ceiling camera and the dominion it surveys. Lower right: Operating the console











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